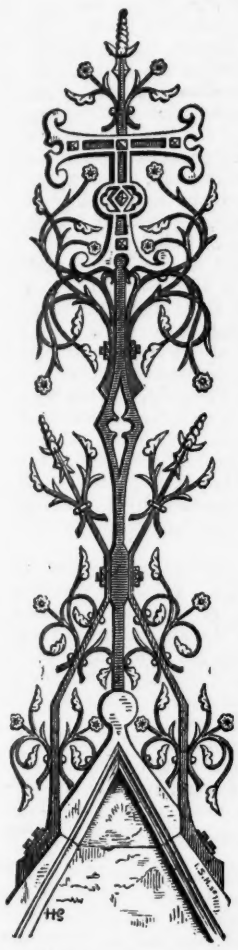
The Builder.

VOL. XXVII.—No. 1388.



Adam Krafft and his School.

1490—1507.

HERE are few visitors to Nuremberg who do not gaze wonderingly and admiringly, in the church of St. Lawrence, on the Tabernacle, or Sacraments' House, a pile of flowery stone-work that runs up to the groined vault of the choir, a height of more than 60 ft., and then bends down gracefully, if deceptively, as if there checked by the roof. They admire also the three sculptured figures at the base, representing the sculptor and his two assistants, and mostly learn that the former was called Adam Krafft. Other works from the same cunning hand they meet with in the town, notably the great tomb outside the church of St. Sebald; so that there are few of the Mediæval artists whose names are more widely known than that of Krafft. Still the extent of his work is little recognised by the large majority, and Professor Wanderer has done a good deed in bringing together a collection of his sculptures with descriptive letterpress in German, French, and English.* The volume includes sixty engravings on wood to a large scale, and if it do not substantiate the right of Master Adam to be considered a worthy compeer of that great genius, Albert Dürer, as the author would have it, it advances his long-recognised claim to be considered a great craftsman. In estimating the merits of Krafft, the period at which he worked, when love for and skill in the severer style of Pointed architecture were passing away, and the style of Renaissance was about to take its place, should always be considered. The present work, the author says, "is intended to fulfil an obligation which the partiality of the followers of Modern Gothic, in their exclusive pursuit of a pure style, has, hitherto, caused to be omitted."

The materials for an account of the life of Adam Krafft here presented are very slight, and, to some extent, contradictory. Thus, in the sketch of him left in the first half of the sixteenth century by Johannes Neudörffer, a writing-master of Nuremberg, it is asserted that in 1490 he took for his second wife a widow, who, to please him, changed her baptismal name from Magdalen to Eve; whereas, a "spaenbrief" not long ago discovered in the archives of Nuremberg, and dated February 20th, 1510, states that his widow, Barbara Krafft (not Magdalen nor Eve, and nothing is said of a third marriage) appeared with her late husband's creditors before the Court, and renounced in their favour the house on St. Jacob's Steig which he had bequeathed to her;—an incident that seems to show, moreover, that Krafft's circumstances when he died were not in a very flourishing condition.

Neudörffer says that Krafft was as dexterous with his left hand as with his right, and that he died in the hospital at Schwabach in the year 1507, a statement which is to some extent corroborated by the fact that one of the last works he executed was a handsome Tabernacle for the church there.

The founder of the Tabernacle in the church of St. Lawrence, the finest and best known of Master Adam's works, was one Hans Imhof, who on the 25th of April, 1493, in the presence of two witnesses, Michael Lemlein and Jörg Holzschuher, entered into a contract with Adam Krafft for its execution. This document, which is drawn up with some care in the details, is still in the possession of Imhof's descendants. Amongst other matters it sets forth,—

"That the aforesaid master shall be bound to work at it with his own hands; and to appoint four, or at least three honest and skilful men to work with him thereat, and meanwhile they are not to take any other employment. But since the said Master Adam has likewise other works on hand, and may have more, he shall keep for those other workmen, so that the men employed hereafter shall not have to quit the work. Further, it stipulates that he shall be at liberty to give directions to such workmen for the space of one hour daily, but no longer without permission of the said Hans Imhof."

Krafft engaged to complete the work within three years for the sum of 700 florins (something less than 60*l.*!). In the rash presumption of being able to finish within three years this work, and likewise to undertake others, Krafft, as we shall not be surprised to learn, deceived himself. His receipts, of two of which facsimiles are annexed by Mr. Wanderer, show that between 1493 and 1495 he had already received by instalments the stipulated sum; and, finally, a gratuity of 70 florins, which Imhof thus sets down:—

"Item—On St. Barbara's day, A.D. 1495, I settled accounts with Master Adam: paying him, first, according to his contract, 700 florins; and, secondly, an agreement of 70 florins—total, 770 florins."

Our author goes on to say that the founder did not live to see the accomplishment of his work. "He died 1499, and it was not until 1500 that Adam Krafft first brought his labours to a close."

This is not quite satisfactory. If the work were not finished in 1495, why did Imhof then settle accounts with Krafft, paying him not merely the amount of his contract, but the extra sum agreed on?

Our author seems to misunderstand a portion of this agreement when, speaking afterwards of the probability that Krafft kept a large number of men employed elsewhere, he says, "It was not without some reason that the contract for the Tabernacle so expressly stipulates that he should not employ more than one hour daily in correcting the work of the two chosen men." The stipulation in the contract evidently referred to the workmen employed on other works on hand, not to the two men at work with him on the Tabernacle.

The form and construction of the Tabernacle are fully illustrated and described in the interesting volume now before us. The wreathed pinnacles, curling and twisting almost like a living plant, have been viewed as remarkable pieces of stone-cutting: they led to the popular belief, indeed, that Krafft possessed the secret of softening stone and hardening it again after it was worked. Mr. Wanderer, however, shows that these each consist of ten and often of more small pieces of stone bored through and connected together by an iron wire, the joints being run with lead.

Some years have passed since we visited Nuremberg;—

> "Quaint old town of toil and traffic, quaint old town of art and song,
> Memories haunt thy pointed gables, like the rooks that round them throng."

It was in student-days, and it seemed to us then a town of pictures, a romance in stone. There was a queer old "public" near the Town-hall called "Zum Gläsernen Himmel," and there we sat in the seat said to have been the usual place of Adam Krafft, who did not disdain the "wheat beer" for which the place was celebrated. The old house has been pulled down since then; but his Madonna and Child, which formerly adorned it, is set up in the new building that took its place.

* Adam Krafft and his School. Being a Collection of his Sculptures still extant in Nuremberg and its Vicinity. By Fr. Wanderer, Painter, and Professor at the Royal School of Art at Nuremberg. London: Williams & Norgate, Henrietta-street.

A TRIFLE FROM MARGATE.

ALTHOUGH Margate has been very full, and even now is well filled, the inhabitants complain of bad times. The spring was cold, so that the first arrivals were late, and the rough weather lately sent hundreds away to their homes. The season has therefore been short, and hence "the tears." Last week, nevertheless, the Jetty, at certain times of the day, was a sight,—so crowded with persons that circulation was difficult. Where all the young girls, in their Noah's-ark dresses and wonderful heels, came from, and where they expect to go to, is a puzzle to the best friends of the sex. On Sunday afternoon, at half-past four, there could not have been fewer than from 3,000 to 4,000 persons on the Jetty and Parade, when suddenly burst a thunder-storm. The sea was enveloped in mist, the lightning flashed, and a flood of rain descended that laid the Parade roadway under water, and made it, as acted on by the wind, a mimic lake. As to the people,—an ant's nest violently agitated affords the best simile. The scud was terrific, and to those who, safely sheltered in the comfortable White Hart, could drily look on, not without interest. Every vehicle, too, was taken up, and in ten minutes not a person was to be seen,—man, woman, child, or nigger. It spoke something, too, for the arrangement of the surface drainage, that so soon as the storm had passed over the roadway was fairly dry again. We cannot say quite as much for other drainage, and the town will do well to take the cesspools seriously in hand. They are now advertising for a new sanitary inspector, and inviting candidates to say for how little money they will perform the duties of that and some other offices combined.

The mayor, who looks like a sensible man in the photographic shops, and his colleagues doubtless know, if they would but remember it at the right time, that cheap things are not always economical. We earnestly invite them not to let the lowness of salary named by any particular candidate blind them to the enormous importance of obtaining a thoroughly competent and suitable man. To maintain the reputation for health of such a pl ce as Margate is of paramount importance; and if one able to do this should offer, and who is, moreover, a man of taste, likely to aid in improving appearances and making the town attractive, an extra 50*l.* or 100*l.* a year to secure him would be a profitable investment, they may be assured. If Margate could be refined, so to speak, and the South-Eastern Railway Company taught their duty, there would be an enormous future in store for this place. Its fine air and admitted salubrity, so far as it is not interfered with and countervailed by man, to say nothing of other advantages, afford a foundation on which a great town might be built, and, we may venture to say, will be built. When the right man comes, Margate will make a start that will astonish its present stagnant owners and regulators. About the immediate neighbourhood of the Parade there is a mixture of Cremorne and Wapping that wants improving away. On the heights spreading away from the Fort, the aspect is different. A large hotel, the Cliftonville, built by a company, is in full swing, and many new streets have been built. There is a want of life, however, up here, and the need of a presiding mind is evident. It was a good thought to name some of the rows

Ethelbert-road and Ethelbert-place; all historical, traditional, and poetical associations should be carefully preserved at resorts of this kind. The Isle of Thanet is so much a place of mere pleasure that the amount of deep interest that attaches to it, its connexion with the earliest history of the country, is apt to be forgotten. At Ebbe's Fleet, near Pegwell Bay, St. Augustine landed in the sixth century; Hengist and Horsa possibly at the same place. The meeting of St. Augustine and King Ethelbert took place a few miles from Margate (the *gate* or passage through the cliff, near the *mere* or streamlet), and it was wise, therefore, to recall the connexion with Saxon times by the names of the new streets.

A good sea-drive would be a valuable addition to the attractions of Margate, and the town ought to look forward and arrange for the formation of one. Some better arrangement is needed with the owners of hired carriages. They refuse to let the drivers go by the hour. They insist on a charge being made for each place visited, which, nine times out of ten, involves a swindle. Moreover, visitors constantly desire a drive without exactly knowing where to go, but are prevented by the present system. An enormous carrying trade is done in the shape of excursions all day to St. Peter's, Broadstairs, Kingsgate, Pegwell Bay, Ramsgate, Richborough, or Minster, and back, and this may make the coachowners careless about accommodating the public in another way. Some of these places afford inducements for a more quiet visit than these excursions admit of, which address themselves only to a part of the community. The view at Kingsgate, which includes Lord Holland's sham Roman villa, ivy covered; Harley's Tower, the tower erected to mark the site of a great battle between the Danes and the Saxons in the beginning of the ninth century; the north Foreland Lighthouse, and other landmarks, all come into sight, and, with the precipitous cliffs and the sea, form a panorama of great beauty.

The cliffs at Margate, by the way, near the Jetty, have been embayed and rounded in a remarkable manner within the last twenty years, and one wedge-shaped piece of the cliff is left standing in a gap alone, and, as seen from near Goodman's photographic studio, produces a remarkable effect.

At Birchington, a ride out from the other side of the town (and on the road several new houses are being carried up), the church, mainly of the thirteenth century, with remnants of Norman work, has been soundly restored. Daundelion and Salmeston both afford remains of ancient buildings, worth investigation.

We mentioned as amongst the steps required to put Margate in the proper track for advancement,—the reform of the South-Eastern Railway; and, without now going into the whole question, we will prove the necessity of it, at any rate, in one direction. We recently printed the complaint of an individual traveller on this line, showing a series of annoyances to which he had been subjected in one journey out and home. We have before us the substantiated complaint of another that, coming from Margate on two occasions within the last fortnight, the train had been forty minutes after time, and that all his arrangements were consequently upset. It is obvious, therefore, that these inexcusable irregularities are not exceptional, but constant. It is of no use upbraiding a board any more than a stone. We appeal to Lieut.-Col. Eborall, advertised as General Manager, and ask if this be proper management, or whether it be not the management that annoys, disgusts, and drives away! We have no hesitation in saying that similar management in the Board-room and offices, if it be going on, is quite competent to wreck the company, and we advise the shareholders to look to it in time. We reiterate our belief that a great future is in store for Margate if those who are concerned act rightly; but they have a great deal to do to assure it.

State of the Serpentine.—A correspondent writes:—As there is every probability of a great number of men being out of employment during the coming winter, I would beg to suggest that the Serpentine River (Hyde Park), which is in a most filthy condition, be properly cleaned out, levelled, and cemented. There is, I believe, a Government grant for this purpose, so there would be no difficulty in the way. It is well known how dangerous this sheet of water is in summer to bathers and in winter to skaters.

THE BRIDGES OF THE METROPOLIS.

THE various bridges recently constructed, and in course of construction, over the river Thames, possess a certain degree of historical importance. They not only serve to mark the progress which has been made during the last century in engineering and architectural science, but they afford, at the same time, remarkable facilities for a comparison of the relative merits of the several systems and designs embodied in the respective structures.

If civilisation finds its origin in, and is maintained by, the useful arts, rather than springing from the triumphs of warriors and statesmen, there is certainly as yet but little indication of its decay. The New Zealander who is to sketch the ruins of Saint Paul's, at all events is likely to discover a more favourable accommodation than historians have predicted.

Within some few years past, besides the removal of the Suspension Bridge which formerly existed at Hungerford, we have witnessed the disappearance of two of the principal structures which hitherto united the shores of Surrey and Middlesex, and in each instance they have been supplanted by works of more magnificent, and apparently durable, construction. In one case, that of Blackfriars notably, there are fair indications that the substituted structure may last as long as Saint Paul's itself.

In 1739, the stone bridge which formerly existed at Westminster, and which occupied a portion of the site of the present iron bridge, was commenced from designs by Labeyle. This bridge was constructed of Portland stone, at a cost of 490,000*l*. It was 1,220 ft. in length, 40 ft. wide, 25 ft. above high-water mark, and had 15 openings. Its total altitude above high-water mark was 27½ ft., and the centre opening spanned a distance of 100 ft.

The present bridge was begun in 1853, and finished in 1862. It is from the designs of Mr. Thomas Page, who also designed the handsome but inglorious structure which spans our polluted river between the new barracks at Chelsea and Battersea Park. The present Westminster Bridge is, perhaps, the widest bridge in Europe, and certainly yields to none in beauty of design and finish, remembering the circumstances under which it was carried out. The necessity of a favourable gradient at both sides for the accommodation of traffic, of leaving sufficient headway at the same time for the navigation of the river, and of keeping within bounds that would not obtrude upon the grandeur that is claimed for the structure of the Houses of Parliament which adjoin it, affected by many complicated restrictions the appearance and durability which otherwise might have been given to the undertaking. It is to be wondered at that with all these difficulties to encounter—and they were not the only difficulties which presented themselves—the bridge shows so many claims to consideration as it undoubtedly possesses. It is 85 ft. wide, 20 ft. above high-water mark, comprises seven openings, and the centre span is 120 ft. wide. It was erected at a cost of 393,000*l*., and completed, notwithstanding much unforeseen and uncontrollable delay in the progress of the works, within nine years. Old Blackfriars Bridge, of which the last vestiges have scarcely yet disappeared, was commenced in 1710. It was constructed also of Portland stone, like old Westminster, from the designs of Mylne, at a cost of 300,000*l*. This bridge had exhibited marked symptoms of crumbling and decay before steps were finally taken towards its removal. It was the most interesting representation of the possible decay to which such structures may arrive of which we have any modern record. Arch after arch was propped up, as many of our readers may recollect, until at last a serious obstruction was opposed to the ordinary navigation of the river. It was only 995 ft. long, 42 ft. wide, 27½ ft. above high-water mark, and had nine openings, the centre one of which measured 100 ft.

Waterloo Bridge, which Canova, the sculptor, thought to be the finest in Europe, is to all appearance as untouched by time and unharmed and perfect in every way as when first finished, now some fifty years ago. It was begun in 1811, while the first Napoleon was centering all his forces towards the invasion of Russia, and was carried out while history looked down on the dreadful spectacle afforded by the retreat of the Grand Army. This bridge is 1,326 ft. in length, 43 ft. wide, having a headway above high-water mark of 27½ ft., and has, as old Blackfriars Bridge had, nine openings. The centre arch of Waterloo Bridge is 120 ft. wide. The bridge is constructed of granite, from designs by Rennie. Its erection cost the sum of 937,391*l*., and only occupied six years.

This bridge, notwithstanding the number of arches upon which it is built and its numerous river piers, from the width of the river at this point, still leaves a total clear water-way of 1,080 ft., an amount which no other metropolitan arched bridge affords.

The next bridge which comes under our consideration is Southwark Bridge, which has only been completed within the past fifty years. This bridge was designed by Rennie, but is accompanied by circumstances which mark it out as one of the most extraordinary contributions towards the science of constructive architecture. It was the first occasion of the introduction of a cast-iron span of such truly gigantic proportions in structures of this character, and, as an experiment boldly testifying to the applicability of cast iron upon a large scale, it paved the way to a new theory and practice of building.

The span of the central arch of Southwark Bridge is equal to that of the roof of the new Midland Railway Station at St. Pancras, and in comparison with the magnitude of this last-named building, the roof of the Moscow Riding-school no longer remains the standard of colossal architecture that it was formerly. It has been surpassed. Southwark Bridge was commenced in 1814, and was successfully carried out and finished in 1819, at a cost of 660,000*l*. The entire length of this bridge is only 700 ft., and the centre opening is spanned by a cast-iron arch of 240 ft., probably the largest single cast-iron span extant.

The present London Bridge was begun as recently as the year 1824. This, like Waterloo Bridge, is constructed of granite. London Bridge was designed by Rennie, occupied seven years in erection, and cost the sum of 2,566,268*l*. This enormous expenditure represents an amount exceeding the aggregate cost of nearly all the other bridges over the Thames.

The total length of London Bridge is 920 ft. It is 45 ft. wide,—not much more than half the width of Westminster Bridge, and has an altitude above high-water mark of 29½ ft. It is composed of five arches only, the central opening measuring 150 ft.

The cost of this structure was provided out of a fund called the Bridge House Estate Fund.

The estates appertaining to this fund—it was stated in evidence which was taken before the select committee appointed in May, 1865, to consider the abolition of tolls on Metropolitan bridges—are held in trust for the maintenance and support of London Bridge. "When the Act for this bridge passed, and the money was to be raised on the credit of the Bridge House Estate, the Government contributed 150,000*l*. out of the Consolidated Fund. The Government also suggested that the bridge should be made 6 ft. wider than it was originally intended to be, which involved a further outlay of 42,000*l*. That amount was also contributed by the Government towards the construction of the bridge out of the Consolidated Fund. The residue of the expense was defrayed by money raised on the credit of the Bridge House Estate, amounting to 431,000*l*., and the difference was made up out of the surplus rents and profits of the Bridge House Estate. The 431,000*l*. were advanced by the Lords of the Treasury upon terminable annuities for forty years, now partially expired, and ceasing altogether in 1871."

Hammersmith Bridge was opened in 1827, and is remarkable on account of its being the first bridge which was erected upon the suspension principle over the Thames. The platform of the bridge is held up by vertical iron rods, let fall from chains which stretch entirely across the river, and are so adjusted as to support the general structure. The main chains themselves in the course of their length across the river find two places of support upon stone piers erected in the river way.

There are two of these piers, as is mostly the case in suspension bridges, upon which a superstructure of masonry or iron is carried up to support the chains. In the case of Hammersmith Bridge the superstructure of the towers is of masonry, in the form of an arch, comprising the width of the roadway. These towers support the suspension chains, which disappear at each extremity into anchorages on the margin of the river at each side. The anchorage plates rest against a firm bed of masonry, which constitutes the abutments. The vertical rods descending from the main chains are fixed to cross girders

of the requisite width, upon which the roadway of the bridge is laid.

Apart from the singular novelty of the structure embodied in this undertaking, it is also remarkable as having afforded that particular design of construction upon which the minimum cost of bridge accommodation was reached. The cost of Hammersmith Bridge did not exceed 85,000*l.*—a sum scarcely equal to the cost of a single arch of many of the other bridges.

A bridge upon the same principle as the Hammersmith one was subsequently erected by Brunel at Hungerford, and was not many years since translated bodily to Bristol, where it is now known as the Clifton Suspension Bridge. The old piers of this bridge still do duty in supporting the girder bridge of the Charing-cross Railway, aided by numerous cylinders sunk in the river. The piers themselves are now chiefly remarkable for their singular conclusion at the summit. The Suspension Bridge at Chelsea, which has already been mentioned as having been designed by Mr. Page, is, perhaps, the handsomest form in which this class of structure has ever been embodied. This bridge was finished in 1858. Three years later the Lambeth Suspension Bridge was begun, as designed by Mr. Peter Barlow, and it was erected at a cost scarcely more than half that of its prototype at Hammersmith. The Lambeth Suspension Bridge, however, is something more than a Suspension Bridge, pure and simple, for some very singular modifications of the suspension principle have been here introduced. In place of a succession of bolted or pinned links for the principal supporting chains, we here find a number of iron wire cables or twisted ropes stretching in unbroken continuity entirely across the river. In place of the usual vertical supporting rods, a series of pendent triangular supports have been substituted to take the roadway, and their operation is stiffened by the application of a giant system of strutting along their line of direction. Each tower is supported on two iron cylinders, which are sunk in the bed of the river and built up internally with concrete and masonry. By this means the usual stone piers have been superseded, and their great cost escaped. There is an entire absence of meretricious adornment in this structure, and by some it is apprehended that it is attended by difficulty to discover anything in it that is fairly ornamental. Still, as a bridge which was begun in 1861 and finished in 1862, at a cost of 50,000*l.*, apart from the challenge which it holds out to scientific criticism, it possesses many claims to consideration. It is 950 ft. long and 30 ft. wide, having three divisional spans of 280 ft. each, its altitude above high-water mark being but 22 ft. only.

Old Vauxhall Bridge, which seems alike to defy criticism and escape it, is a compound structure of stone and iron. It has no less than nine arches, within a total waterway of 765 ft.; whereas Waterloo, with the same number of openings, gives a waterway of 1,080 ft. The span of the centre opening of Vauxhall Bridge is but 70 ft. It was erected from designs by Mr. J. Walker, at a cost of 370,000*l.*

It is very curious to observe the order in which modern bridges have arisen over the Thames. Between London Bridge and Southwark there is the South-Eastern Railway Bridge designed by Mr. Hawkshaw, a substantial and costly-looking iron structure. It is a plain girder bridge, supported on rows of fluted-iron columns, embedded in the river. What little ornamentation has been attempted in this structure is in keeping with the general design, which fairly ranks as one of the most notable achievements in the adaptation of iron to structural purposes.

Looking from the other side of Southwark Bridge towards Blackfriars, we find the London, Chatham, and Dover Railway Bridge now interposes, although from that spot it is somewhat too remote for critical inspection. Between Blackfriars and Waterloo there is as yet no new structure intervening.

Between Waterloo and Westminster is to be met with the conglomerate or insoluble structural metamorphosis known as the Charing Cross Railway Bridge. From the circumstance of this bridge being largely used by foot passengers, the superior objectivity of the Warren girders as perceived from the river some slight distance off, and the frequent passage of trains, a process appears being continually enacted of indiscriminate human sacrifice, which it would be well to screen from the outer world.

It is happily but a visual distraction, which could be altogether prevented by clearer marks of distinction between the footpath and the railway. As it is, it is a utility bridge, and, perhaps, it aims at being nothing more in appearance. Between Westminster Bridge and Vauxhall, Lambeth Bridge is interjected,—not a railway bridge, however, as the three preceding ones alluded to as late intermediary erections.

Between Vauxhall and the New Chelsea Bridge, which has itself only been erected during the past eleven years, is to be found, perhaps, the widest, and certainly the most unique, railway platform over water in the world. This is formed of the united bridges of the London, Chatham, and Dover, and London and Brighton lines. Although outwardly these two bridges seem to correspond and closely resemble each other, appearing from their connexion but as one structure, their features and style of construction are altogether dissimilar. The half-width more recently added possesses many novel claims to notice. It is, in the first instance, a genuine and very fine example of wrought-iron riveted girder work. None of the riveting is counter sunk, and it shows up in harmonious lines of strength admirably along and upon the surface of the work. This is an exception to the practice which is usually observed in analogous cases, and appears to be a very commendable one. Its more special and singular feature, however, in a scientific point of view, is perhaps attributable to the circumstance of its main girders being continuous girders throughout its whole length across the river. It is an *experimentum crucis* as to the boldness and freedom with which iron may be skilfully handled.

Some further distance up the river, beyond the old Battersea wooden bridge, but still within the limits of the metropolitan railways, there is also a fine substantial railway-bridge, recently erected, in connexion with the Clapham Junction system and the railways encircling London, from Hammersmith at one extremity, to the Thames Tunnel at the other.

The expansion of modern civilization, in one form of national embodiment, at all events, seems clearly exemplified in the multiplication of bridges along the course of the Thames.

No doubt a paramount regard for the unimpeded navigation of the river has long retarded or prevented the erection of suitable means of accommodation over the river below London Bridge. The only attempt ever made in this direction was made under ground. We are at a loss to imagine any explicable reason why in the face of the unbounded extension of the metropolis on all sides, and the extraordinary railway facilities to which we may have recourse, London Bridge should for ever remain the common goal of navigable merchandise and the arbitrary line beyond which people must either cross the river in a balloon or burrow under ground. Owing to the vexatious barrier offered by this structure to the uniform extension of that accommodation which prevails elsewhere, we find that the whole of the eastern and south-eastern districts of the metropolis are totally cut off. From London Bridge to Bow on the one side, and to Blackheath and Greenwich on the other directions of dense and fastly-extending population, no practical means of communication exist;—while, within equal limits on the other side, there may be probably as many as twelve or fifteen bridges. Since the usurpation of the Thames Tunnel by the railway, the only prospect of intercommunication held out to the inhabitants of the opposite shores at about these points is that likely to be afforded by the Tower subway now in course of construction for the accommodation of immense portions of the metropolitan area, where, if anywhere, the population may be seen gravitating in unhealthy numbers and mass around the head-centres of traffic and manufacture.

Should population and traffic tubes be multiplied eastward along the course of the river, they would doubtless effect much towards giving vent to a long-felt want of commercial intercourse across the river; but it is questionable whether their utility would recommend them to unhesitating and general adoption, as in the case of a good substantial undertaking above ground. It all depends upon the question as to how much longer London Bridge is to be tolerated as the commercial extremity of the metropolis; that being once satisfactorily determined, we may speedily have half a dozen bridges further down the river, uniting the very busy and very populous localities of Bermondsey and Whitechapel, Rotherhithe and Shadwell, Poplar and Deptford, Greenwich and the Isle of Dogs, and all those circumjacent districts which have parted years since with their suburban reputation. Some few years ago, a design for a high-level railway-bridge below London Bridge was projected upon novel principles, which afforded ample room and verge enough for the passage of the highest-masted vessels, and of which structure no portion whatever would have been within river limits. Should high-level bridges be opposed in any way to those interests which congregate round Old London Bridge, it is fair time to take into consideration whether London Bridge itself might not, with many advantages, date its claims to attention from some more favourable situation. In that case a more convenient class of structure might be substituted than such as should necessarily leave so great an amount of headway beneath them as the present mode of traffic would demand.

HOUSE-BUILDING: CHISWICK.

THE continuous and prodigious growth of London manifests itself in a constantly widening circle round its centre. One open space after another disappears, and green fields and gardens in all directions are speedily assuming the neutral tint characteristic of building plots. In one quarter that may be called suburban, say in the East of London, rows of cottages are run up; and in other quarters, less remote from the centre of the metropolis, great blocks are built of improved dwellings for the working classes. In another locality, say New Cross, or Peckham, newly laid-out streets or roads are being quickly lined with ranges of houses for the occupation of persons of a higher *status* in society than the conventional working-man,—the tenants who can or do, pay from 28*l.* or 30*l.* to 50*l.* a year. In other localities again, "terraces" and "places" are laid out, and rows of houses erected, of a larger size and more pretentious character, for which still higher rent is required. And yet, again, there are other localities in which single and semi-detached villas are provided, which rank next to mansions, concerning which last-mentioned class we have not, at present, anything to say.

While there has been an increase in the number of new houses provided in the metropolis from year to year, there has been little or no improvement in the style of the majority, materials, or workmanship. To this remark exception should perhaps be taken in favour of the improved dwellings for the working classes here and there, in which a beginning has, at least, been made in the march of improvement. For the rest, from the detached and semi-detached villas downwards, there has been little or no improvement. It is in but few instances that these new erections are put up with a view to either permanent possession or occupation: like Peter Pindar's razors, they are made—to sell. An ordinary mode of proceeding is, for the speculator to run up the houses at as cheap a rate as possible, to get them tenanted, and to sell before time has been allowed for the tenants to find out fully the wretched and comfortless character of the bran new houses into which they have entered. In a good many instances, indeed, the first tenants are induced soon after entering to purchase their houses, by the help of a building society or otherwise. In time—and it does not take a long time—they discover what's what. They cannot drive in a hook to hold, in the brick joints without, for a bird's cage, nor fix a brass-headed nail to hang up a picture within. Very soon locks, latches, window catches, and other ironmongery fittings, low-priced but not cheap, which never performed well, are universally unfit to serve their purposes. All the woodwork shrinks to an amazing extent; doors bang and windows rattle; there are chasms everywhere and fierce draughts through them, and the house becomes a place unfit for a human being either to be born, to live, or to die in.

Among our favourite suburban building localities a new one has recently sprung into popularity. We refer to "Strand-on-the-Green," in the parish of Chiswick. The favour with which this locality is now regarded may be attributed to several causes, and amongst them to the fact that the Prince of Wales has taken a lease of the delightful seat of the Duke of Devonshire, Chiswick House, immediately adjacent. The locality has, besides, its own great and independent charms in the number, variety, stature, and exceeding beauty of its forest trees, and the profusion and luxuriance of its gardens, orchards, and shrubberies; in the ever-attractive Kew Gardens hard by; in the stately river flowing past; in a word, in the greenness, fertility, and salubrity of that portion of the Thames valley.

As compared with building districts in the higher regions to the north of London, such as Kensal Green and Highgate, Strand-on-the-Green is at a disadvantage, that may, however, be estimated lightly—namely, the provision of cellar accommodation, which, from the comparatively narrow margin between the natural ground-level and high water in the Thames is impracticable. One "Gothic" mansion in the district, with a river frontage and two peaked round towers, suffers from being cellared, and at high tides has sometimes 3 ft. or 4 ft. of water standing in the bottom, which, of course, saturates the greater portion of the house, and keeps it in a damp condition for an indefinite time after each flood.

Some good houses are in process of erection, or have been recently finished, at the "Strand-on-the Green;" amongst others a pair of semi-detached villas in the Swiss châlet style. They are lofty and roomy, and apparently substantially built, but are hard and angular in outline. Some of the others in process of erection show the old vices of construction in full bloom and vigour.

One new house has been recently erected in the locality for Mr. W. T. Wells, of Regent-street, and is fast approaching completion, which is in contrast with all this. Mr. John M'Ewen, the designer of the house in question, has certainly set a good example to other builders, and taken a step in the right direction. Thames Bank House, to which we are referring, has its principal front to the river, from which it is separated by a gently-sloping lawn and carriage-drive, about 30 yards wide in all. It is divided into five bays, including three gables,—one in the centre, and one at each end, rather higher than the central gable. All the external angles of the house and the chimney-stacks have stone quoins, and the several parts appropriate cornices and copes. A good view of the house is presented to the river on the angle from both up and down stream. The entrance to the hall, which will be laid with Minton's tiles, is on the ground floor of the centre gable, the door having one chamber window above, and over that, in the pediment, a stone shield projected. There is not any pretension to purity of style or elaborateness of decoration. It is noticeable as a piece of substantial work.

We look for a change in matters generally that will make buildings be what they seem, that will prolong the life of houses sufficiently to cluster such associations round them, and to make such comforts in them possible, as to entitle them to the designation of homes.

FROM PARIS.

THE group of figures representing Dance, in front of the new Paris Opera,* has been cleansed of the ink-stains produced by a bottle being dashed against the naked Bacchante. We all recollect the mutilation of the allegorical figure of the city of Lille, in the Place de la Concorde, by a maniacal workman, because the figure resembled his mother. He was punished, not severely enough, by the law, but the disappointment of the man must have pained him when he saw how the monument had been completely restored.

The new commission appointed to represent France in the collective labours of the International Congress of Weights and Measures, call upon all governments anxious to adopt the metric system, to delegate *savans* who will aid in carrying out the work, and to provide standard copies of the platinum prototype under the surveillance of the superintendent of the Director-general of the Archives of the Empire, to serve for the verification of the real equivalents between the French metric system and those of other countries.

We have already mentioned that the statues of Acis and Galatea, at the Luxembourg, were defaced by colouring matter, about three months ago. The same gentleman (calling himself Esquiros) who cleaned up—as only a practical chemist could do—the Opera group, has succeeded at the Luxembourg. The Acis and Galatea, at the Luxembourg are due to the chisel of M. Ottin.

It is said that successful experiments have been made with an American stone-cutting machine, worked by steam, giving a result of an economy of one-eighth of that required to do the same amount of manual labour. We have been long acquainted with M. Gay's machine, and have seen it at work in the quarries near Paris. There is a great difference between stone-sawing or stone-cutting, and quarrying by steam. In the two first we have only to place the block to be dressed under the wheel, or in face of it, so that the stone shall not shake. The operation of quarrying requires another system, by which M. Gay, of 5, Rue Jean-Jacques-Rousseau, cuts the stone into square blocks, leaving the sides of the drift perfectly smooth—fit for setting. We must say that a result of 40 square mètres cut into handy blocks of any dimension, instead of 5 to 7 mètres per day, by ordinary quarrying and blasting, is the proof of a certain intellectual and ingenious progress on the part of M. Gay which has attracted the attention of the highest authorities of the Mining School. Cutting into a face of limestone to a depth, horizontally, of 2 ft., with the clean seams about 2 in. wide, and a scouring stream to take off the dust, the machine seems to be to us the best as yet tried at large quarries in the open air or in pits. There is not an atom of waste to signify, or chips; so that future labour of dressing being much saved, the economy is great.

* See p. 681, *ante*.

THE LATE MR. E. BUCKTON LAMB, ARCHITECT.

WE refer with very considerable regret to the decease of Mr. E. B. Lamb, who died suddenly at his residence, No. 3, Hinde-street, Manchester-square, on the 30th ult., in his sixty-fourth year. He was the son of Mr. James Lamb, who held an important Government appointment, and who was an amateur artist of talent, and an occasional exhibitor at the Royal Academy. It was from his father that Mr. E. B. Lamb first imbibed his taste for art, and he was articled to the late Mr. Cottingham, architect, with whom he duly served his time. One of the first buildings superintended by him was the church of St. Philip, Lloyd-square, Clerkenwell, in the early days of the Gothic revival. Since that period he has erected other churches to the number of between thirty and forty in various parts of the country, of which the most noteworthy are at Healy, Thirkleby, and Aldwark, all in Yorkshire; West Hartlepool, Egham, Gospel Oak-fields, Kentish-town, Addiscombe, &c. He was also extensively employed in remodelling and adding to country mansions; and amongst works of this description may be mentioned Great Brickhill Manor, Hughenden Manor, and Wakefield Lodge, all in the county of Bucks; Holt Hall, Norfolk; Thornham Hall, Suffolk; Mapleton, Yorkshire; Montreal, Kent; and many others. Illustrations of several of his buildings will be found in our volumes. In addition to works of this class he carried on an extensive and varied general practice. Mr. E. B. Lamb published several works on architecture, and was an early worker with the late Mr. Loudon. Mr. Lamb was an enthusiast in his profession, and took a great interest in all matters calculated to advance and improve the public taste in matters architectural.

On some future occasion we may speak more fully of Mr. Lamb and his works. He was by no means an architect of the pattern-book school, but constantly endeavoured, even at the expense sometimes of beauty, to exhibit originality. He was a Fellow of the Institute of Architects.

THE CHADWICK MEMORIAL COMPETITION, BOLTON.

THE sub-committee appointed to obtain designs and estimates for the monument proposed to be erected to Dr. and Mrs. Chadwick, of Southport, formerly of this town, reported at a recent meeting that they had obtained models from Mr. W. Calder Marshall, R.A., the cost to be 1,400*l.*; Mr. Jos. Durham, 1,050*l.*; Mr. Birch, 850*l.*; Mr. E. G. Papworth, 1,200*l.*; Mr. E. E. Geflowski, 1,050*l.*; and Mr. J. Birnie Philip, large model, with pedestal of fine axed granite, 2,200*l.*; small model, with granite pedestal, 1,600*l.*; or if denuded of its bronze figures, 1,200*l.* If stone be substituted for granite Mr. Philip would accept the following prices:—Large model, 2,000*l.*; second model, 1,450*l.*; with the base devoid of figures, 1,050*l.* Mr. Geflowski had also since written, that in case no alto-relievos be desired on the sides of the pedestal, his price would be, for statue not less than 8 ft. 4 in. in height, with pedestal in granite or stone, 840*l.*; with two alto-relievos, 160*l.* extra; and with three alto-relievos, 210*l.* extra. The town-clerk stated, that in addition to the above, Mr. Matthew Noble, Mr. John Bell, and Mr. Woolner were also invited to send in competitive designs, but declined.

In answer to questions, the town clerk said the sum named to the sculptors was 1,000*l.*, and they were requested to make the statue of such a size as would be consistent with that of Crompton, behind which it was proposed to be placed. The dimensions of the Crompton memorial were sent to all the artists.

Mr. Hall asked how much money the committee had in hand, because that might determine to some extent the selection to be made.

The Mayor said if they spent about 1,000 guineas, they might take it for granted that they had 500*l.* at least to raise yet.

At a subsequent meeting of the general committee, the models submitted by Mr. Birch and Mr. Geflowski obtained the preference, and on a division, there voted for the model of Mr. Birch, 15; for that of Mr. Geflowski, 6. It was then resolved that the commission for the execution of the statue be entrusted to Mr. Birch. At the suggestion of Mr. Taylor, it was resolved that a medallion portrait of Mrs. Chadwick, or a design commemorative of her works of charity and benevolence, should be incorporated with the statue.

CONCERNING CERTAIN CORNISH TOWNS.

ONE would think, after so much showing-up as Truro and Falmouth have had, that the sewerage in those towns would have undergone some improvement.

Not a bit of it. I have, in a run into Cornwall, just visited those towns, and anything more loathsome than their state cannot well be conceived.

I would sincerely caution all intending tourists to avoid those two towns; or, if they will not, so far take my advice then simply to be content with a walk through the principal street of each town. The stenches,—the fearful, intensely wild, compressed essences of stinks,—they will meet with in the other streets are sickening for me only to contemplate.

Contemplate! I have been out of Cornwall just five days, yet those stenches I fancy I now have half-way down my throat. Fancy every, any, foul, loathsome, nauseating, noxious smell you can, and in either Truro or Falmouth you shall have its equal. Is it any wonder? In Truro the sewers are of common dry stonework, rectangular in section, and various in size. They are for the most part about 18 in. wide by 2 ft. or 3 ft. high, covered with large flat stones as they come from the quarry. If their edges do not meet, why they put some smaller stones upon top; no mortar or cement is used in their manufacture. Where the wisdom of the commissioners has so dictated, there is on the side of the road, or in the *trottoir*, nearly always under a window, a cesspool 3 ft. or 4 ft. square, made of dry stonework, and covered with a cast-iron slab; at the upper end, on a level with the gutter, the road-water runs into this, an untrapped opening. This untrapped opening is by the people living near taken advantage of: they throw into it their slops, garbage, and nightsoil.

Fish have been plentiful in Cornwall this year: fish bones and fish offal lie in every opening, mixed with human excreta, soapsuds, and so forth. One of the cesspools I saw in Campfield-hill, so nauseously foul, that I fairly retched; and that in Mitchell-hill had such an effect upon a friend that it acted as Epsom Salts upon him, and he lay on a sofa taking brandy in the evening: it was close under a window. The one in Campfield-hill was placed on the other side of the road to the cottages: the road is from 10 ft. to 11 ft. wide. As I looked in astonishment, I heard one poor wan-looking middle-aged woman say to another—"Ah! it's too bad: that there place stinks so, it do, one can hardly live here, and it's no use to say nothing."

In Ryder-street, Union-street, Fairmantle-street, Cardew-street, are these cesspools to be found, and all in the same state. The gutters in these streets, and, generally speaking, throughout the town, are paved with quartz, locally called *spar*, pebbles of irregular shape; of course the paving is badly jointed, so in this way the garbage and liquid refuse that the inhabitants throw into them are as much as possible retained on the surface, and the spreading of noxious exhalations expedited. Some of the streets are

paved in the same outlandish manner, and this in a county famed for its beautiful granite!

I question if either commissioners or surveyor ever heard of granite paving-setts. By the bye, the surveyor has 60*l.* per annum, I believe, but am not sure, paid fortnightly, and he is not allowed to do anything else. If these cesspools are bad undisturbed, how much worse do they become when the man comes round "to clean 'em out a bit when the weather is nice and dry." The operator has a shovel made like a spoon, only not so much dished: with a handle or shaft to it, I should say, from 6 ft. to 7 ft. in length, he raises the cast-iron cover, at once exposing the blueish-black, putrid, bubbling, semi-liquid mass; sinking his shovel into it, and using the long handle as a lever, he brings up shovelful after shovelful of the horrible stuff, and lays it, spreading itself like something animate at the side of the reservoirs of poison, "out of the way of the road you know, sir," where it remains until it is fetched, which may be this afternoon or to-morrow morning; perhaps to-morrow morning, seeing there is but one scavenger's cart in this town of 11,300 inhabitants. No regular system of sewerage is there in the town; they do not even see that the new drain empties itself properly into the river that runs through the town. If they meet with an existing drain, of whatever size it may be, "why they make 'em join, o' coorse: stans to raison the drain empts hisself somewheer." The cesspools are in untrapped communication with the sewer: the matter in the cesspool cannot get beyond a certain height in it, for a hole in one of the sides of the pit takes it off into the sewer. The sewers are all supposed to empty themselves into the river. The river is a piece of mud, several feet thick, nearly two miles in length, and of a width for the upper half of its length (that closest to the town) of from 100 to 300 yards, through which meanders a narrow channel, which is every year getting narrower and shallower.

In Falmouth the same sort of sewerage exists. In describing that of Truro I have described that of Falmouth, though of the two Falmouth is the worst, if worst there can be.

In Falmouth the surveyor has, I believe, 1*l.* a week, paid fortnightly. There the drains empty themselves into the sea. On landing from the steamboat on the jetty in Market-strand, I could at once testify that some drains empty themselves into the sea; even the pebbles on the little beach are bluish black from the sewage matter pouring over them. But even a blind tourist could discover the proximity of sewage matter. In a boat going along the shore, you see drain after drain, high up the wall, pouring its foul contents into the lovely sea; you see block after block of rank, ill-looking houses, and you see privies and ash-pits overhanging or bordering the sea, the stain from the matter coming from them all down the sea-wall.

Falmouth in one respect is ahead of Truro, for it has waterworks. The reservoir is about four or five miles from the town; the fishing in it is strictly preserved, for it is rented by some gentlemen who keep boats on it.

I did not go into Cornwall to get cholera, or fever, or even to get sick on foul smells; I had quite enough of it in Truro and Falmouth, so I did not go on to Penzance: therefore I know nothing of its state other than I heard a lady complain of the dust and the absence of anything remotely resembling a water-cart, save one day when she saw on the Esplanade an empty one pass by.

This is the way Cornwall seeks to have a healthy population, empty workhouses, low rates; and this is the way she encourages tourists to visit her lovely coasts.

And—will you believe it?—though some splendid water can be found in the neighbourhood, yet influential people in Truro have again and again opposed its being brought into the town; and now that, after repeated attempts, an Act for the creation of waterworks has been passed in the last session, grave doubts are entertained if a company can be formed to do the work.

No: Truro people prefer having their water from the wells that are sunk in different parts of the town, having water that is full of organic remains of diluted sewage; and, as if that was not enough, to have a fine lot of zymotic diseases in stock, they must allow conduits full of poisonous gases to distribute their contents throughout every street in the town.

Falmouth will not have a proper system of sewerage, for the present system did when they were children, and why not now?

Truro believes itself a marvel of cleanness, and is inclined, in solemn council assembled, to speak slightingly of people suggesting any alterations. Perseverance is generally rewarded; and so, if in Truro and Falmouth they have not had fever nearly all the year round, they ought to have it.

PRO.

THE PICK AND THE SHOVEL AT WORK AT CHATHAM.

To those who entertain the conviction that "the noblest study for mankind is man," it follows, with some degree of logical sequence, that the worthiest title by which architecture can claim the respect of the philosopher is its rank as a branch of ethnology.

To those who are habitually accustomed to regard the art, the science, and the practice, of the builder, as a special, and by no means secondary, branch of the finer and more subtle crafts which it is given to the human intelligence to perfect, such a view as the above may seem, at the first glance, utterly inadmissible. And yet, on further reflection, it will not prove altogether strange to our readers. The more our attention is directed from the practice, to the history, of architecture, the more distinctly does the mind become impressed with the mode in which the important function of reflecting, and recording, the phases of social life, is fulfilled by the creations of the builder. Of how many nations and races, of whom no other relics remain, have we the unnamed and crumbling walls, or the carefully constructed, and long hidden, sepulchres? The art of the potter, himself an early servant, or brother, of the builder; the art of the founder, exercised on implements that appear to have served alike the purposes of the warrior, the hunter, and the timber hewer; the yet earlier and ruder toil, for it can scarcely with propriety be termed art, of those who chipped knives and arrow-heads out of flints, or scraped bone into the predecessors of what we call needles; these alone have left some faint and few relics of human life that are more ancient (possibly, for even that is not certain) than the ruins of prehistoric buildings. Thus the steadiest, if not absolutely the longest, ray that is thrown back into the unmeasured night, which preceded our present early dawn of civilization, is lent by the lantern of architectural research. Those who will not allow architecture to be called a branch of ethnology, must yet admit that some of the most important data of the later *quasi* science are due to the ancient tectonic art.

Nor is the relation confined to the province of historic architecture,—of antiquity and archæology. It is no less apparent in the practical, striving, busy life of the day. To how many of the most cultivated workmen—workers with the intelligence, or with the fancy, no less than with the skilful hand—is not the architect called on to ally himself? In the mathematical science of construction: in knowledge of the strength and qualities of materials; in the operations of the quarry, the ravine, the kiln, the forest, and the timber-yard, the architect stands on common ground with the engineer. In decorative art, he is linked with the painter, the sculptor, the smith, the moulder, and founder of metal: his occupation is not foreign to that of any apt student in the wide field of artistic design. In regarding the surroundings of his creations, he must seek the aid, if he do not himself possess both the taste and the experience, of the landscape gardener, the horticulturist, or even the cultivator on a wider scale.

No less close is the link which binds the architect to the soldier, especially to those corps, the *élite* of all armies of the world, to which the opposed and complemental functions of the arts of construction and of destruction are especially committed,—the *genii* of foreign armies, the Royal Engineers and Royal Artillery of our own. So close, indeed, is the similarity between the education of the Royal Engineer officers of the day, and that of the civil engineer, the architect, and the surveyor, that the officers of that illustrious corps are looked to, by the Government of this country, to discharge many of those functions which we may be pardoned for considering to come rather within the province of the civilian, who has been specially trained to their discharge. Thus not only one special function of the mechanical engineer,—the construction of ordnance,—is discharged as a military duty, but the formation and maintenance of the great constructive works of our arsenals and dockyards, the Ordnance Survey, and minute mapping of the entire kingdom, and even the purely architectural work required for the accommodation of the Department of Science and Art at South Kensington, are all committed to Royal Engineers. We must not be understood as wishing to express an opinion, at this moment, as to the greater or less advisability of this course; we are only concerned to point out the close and intimate relationship existing between the architectnre of peace and the engineering of war.

We have before referred to the influence of the progress of the art of war, on the public, and, in a minor degree, on the private, edifices of a country. It is evident that by far the greater part of historic architecture reflects the exact state of the relation between the offence and the defence at the date of erection. The clustering towers of Mediæval Italy came down before the face of the rude falcon, or saker, or whatever was the name of the clumsy engine that was the predecessor of the rifled ordnance of the day. It was not necessary to cannonade them all. The subjugation of one stubborn noble chieftain, such as the one of whom Carlyle tells us in his "Life of Frederick the Great," by the hoarse and unaccustomed eloquence of one gun, such as was then thought heavy, sapped the very foundations of the keeps of that chieftain's peers. When towers and turrets were known to be indefensible, they ceased to be built. And thus it has come to pass that, within less than 500 years, that form of seignoral dwelling which was, in some parts of Europe at least, so common as to be universal, attracts, by its relics in Ireland, such curious speculation at the present day. Bel, Apollo, Priapus, ugly forms of Indian, of Phœnician, or of African worship, are all appealed to, or ransacked in order to explain the very simple fact that, when times were rough, the arm of law feeble, and cannon unknown, gentlemen built towers to live in, because they were safe with a double safety. They afforded their owners a wide and reassuring look-out, so as to give a tolerable safeguard against surprise, and they were so difficult of access as to be able to resist anything but a blockade.

It is not only, therefore, for the reason that we have habitually kept open a limited space in our columns for matters of vital social interest, although not directly and immediately connected with either the science, the art, or the trade, of the *Builder*, but from the fact of the intimate relation of military engineering to architecture proper, that we have, from time to time, called the attention of our readers to the rapidly alternating phases occupied, during the last few years, by the arts of attack and of defence.

On one point of military order alone, the *Builder* has been led more than once to insist, from the profound conviction of its vital importance to the defence of the future. First, and almost, if not altogether, alone, among the science publications of the day, we have pointed out the indispensable necessity of rendering each soldier of our small but admirable army, an engineer, or, if the term is better liked, a sapper. Familiarity with the employment of labour, intimate knowledge of the difference between the speed and facility with which a taught and an untaught pickman can make a hole in the ground, some personal acquaintance with science, and circumstances of war on the Continent, and a careful study of the current incidents of both the German and the American wars, have led us again and again to insist on the importance of the spade as a weapon no less essential to the soldier than the bayonet. It is with great satisfaction that we now see, for the first time, that the efforts of the advocates of common sense have not been altogether lost in this important matter. We are abandoning our time-honoured English method of learning nothing without the sanction of a drubbing. We are actually thinking it desirable to turn practical attention to the best method of providing sudden shelter for our troops, without having had the lesson forced on our attention by the loss of a campaign, of a division, or even of a man. "The Pick and Shovel for Troops" has appeared among the broadsides by which our daily contemporaries strive to attract the notice of those casual purchasers who are fain to look for amusement in their columns when London is out of town.

The French, we are told, have for some time recognised the primary importance of the view we have so strenuously urged. In 1867 were issued, "Observations sur l'Instruction sommaire pour les Combats," in which it is distinctly stated that the use of arms of precision (and still more, of arms of repetition) has trans-

ferred the advantage from the attack to the defence, in the case of troops advancing over open ground. The distance of three or four hundred yards is enough to expose an advancing corps to an annihilating fire. Distance, within such limits as to constitute actual military pressure on the field, is no protection. Courage, pluck, discipline, all that distinguishes an army from a mob, are utterly valueless in the face of a sustained fire; so that the enemy do not run short of ammunition, and the period of exposure extends over more than a few minutes. In any case, the French strategists urge, an advancing body of men would arrive too much weakened to contend with success against an enemy prepared to receive them, and who had themselves been protected from fire.

Again, in a paper called "Instruction sur les Franchées d'Abris," rules are laid down for the rapid construction of trenches for the shelter of the troops forming them from fire. Before the death of Marshal Niel (a great loss to the French army), a conference of officers was held under the presidency of that distinguished administrator, in which the necessity of accustoming infantry to protect themselves by *impomptu* field works was fully admitted and insisted on. Napoleon, himself an engineer (as proved by his noble works of national intercommunication, no less than by the great development given in his tactics to the artillery), especially condemned the reluctance shown by officers and soldiers to using the pick and shovel. If, with the artillery of his day, Napoleon held that field fortification should be improved, and that the art of the military engineer was in arrear of that of the officer of infantry or of cavalry, what would have been his views, and what his dispositions, if he had been a grim witness of the strife between Armstrong and Whitworth.

In the American war the country was furrowed with trenches, and turned into a perfect rabbit-warren of rifle-pits. General Grant, no less than his antagonist, made more use of the spade than had ever been the case in the previous history of war. An extract from an American work is quoted in the French report to which we have referred, to the effect that a Federal brigadier, having had to change his position twice in less than an hour, left behind him two lines of nearly completed intrenchment.

After having received, in the Royal Military Academy at Woolwich, the only systematic education which, in this country, can be in any way compared to that given in the seats of the highest Continental culture, the newly-commissioned officers of the Royal Engineers are now sent to pass a certain course of practical study, at the School of Military Engineering at Chatham.

Experiments have for some time been going on at this establishment, as to the method of providing instant shelter for troops, regard being had both to the minimum section available for use in a field, parapet, and ditch, and to the maximum amount of labour that might fairly be expected from the individual soldier, duly trained and directed. The section arrived at is that formed by the excavation of a trench 4 ft. wide, and 15 in. deep, the erection being thrown into a mound, of course on the side exposed to fire. An untrained party is said to have executed such a trench in less than half an hour. Of course much must depend on the nature of the soil. Military drill has the great advantage of accustoming the sappers to work more closely to one another than is the wont of our navvies and miners. A linear yard of trench is allowed to each man in common trench work, and only 2 ft. in flying sap.

A more serious experiment is reported as having been made last week, under the immediate inspection of the general officer commanding the Chatham district. The 27th Inniskillens, the Royal Marines, and the 1st and 2nd Depôt Battalions, furnished a total force of rather more than 1,000 men, who were employed, distributed into three reliefs, in the formation of a redoubt under pressure as to time. The length of the face of the work is stated at a little under 140 ft., and the work, with all its requisite defensive details, was completed in eighteen hours. The ground was somewhat unfavourable over a portion of the line selected, being hard, compact gravel. But the officers threw themselves on the resisting element, not horsed, but pick in hand, and rough and smooth were overcome, guns mounted, and intrenching instruments removed, before the time fixed for the visit of the inspecting officers.

We have witnessed with the utmost satisfaction this step in the right direction. The method adopted is not identical with that to which we endeavoured to direct the attention of the service; but, on the other hand, it is thoroughly and entirely military, and appears to have been eminently successful. We entertain no doubt as to the advantages of our own suggestion, but it is possible to hold to that conviction, without in any way underrating the result actually attained. The essential thing is that the infantry soldier should, as a matter of course, become accustomed to the use of intrenching tools; the pick and shovel drill, if officers like to call it so, should be as familiar to him as rifle and bayonet drill. As to the best method of doing this, especially considering the small size of our army, we are willing to speak with great deference to the practical experience of the staff. So long as the *non possumus* was opposed to the plain prevision of common sense, we held it right to speak in an unfaltering tone. The Papal excuse (and we are speaking of actual written communications from the highest military authorities) is now withdrawn. The order from the Horse Guards is "Experiment." To the result of that experiment, boldly and energetically carried out, we can only wish God-speed.

It will be remembered that the financial element was not excluded from our calculations. That under the energy and spur of emulation, officers and men may freely work, to show what they can do, has now been happily proved. But human nature is not absolutely changed, even if some of its weaknesses be eradicated, by military drill. It must be remembered that, as far as the present private soldiers of our army are concerned, they are under contract with the public. It would be an undue strain upon that contract to insist upon the performance, under its terms, of the work of the sapper, in addition to that of the rifleman. Nor must the rightful interest of the officers be neglected. Uniforms are extremely expensive. We can speak, from a very vivid experience, of the influence of hard civil work on the augmentation of the tailor's bill. For the infantry officer, this influence will be as important as it will be unwelcome. To maintain that spirit of hearty satisfaction which is essential to the wellbeing of an army in time of peace, these considerations must be borne in mind. Even if officers and men, from sheer patriotism, *esprit de corps*, or any other motive of noble emulation, will freely give to Old England an amount of muscular labour which is "not in the bone," do not let us expect to mulct them also in pocket. The House of Commons, not always wishing to loose the purse-strings of which it is a somewhat capricious guardian, must be applied to in support of the new educational movement, unless, as we had the honour to suggest, that movement can be made self-supporting. That such can be the case we have no more doubt than we have of the necessity of the change. Marshal Niel and H.R.H. the Duke of Cambridge have come over to this opinion as to the latter part of the question. We anticipate, sooner or later, a similar conversion as to the former fact. In a question which, after all, is a matter of engineering, we have no doubt of the value of engineering experience. That the experiment now reported from Chatham is successful we rejoice to believe; but success, to *be* success, must be permanent.

We trust, therefore, that amid all the satisfaction which must be so justly entertained by those who have advanced thus far in the course of teaching the soldier to protect himself, there will be room for a whisper to be heard from the source whence the first alarm on the subject proceeded. The *Builder* rejoices in the fraternisation of the soldier. He desires it to be durable. To insure durability he wishes to see it based on those sound principles of fair play, common sense, and respect for the most powerful motives that ordinarily actuate mankind, which may be left out of sight on a spurt, but can never be safely neglected in the long run. Let every soldier be an engineer. Let him be made so with his own hearty concurrence, with the least possible delay, not at his own cost, and not at the cost of the tax-payer. If this can be done without such arrangements as shall tend to make the British army in some sort a self-supporting institution, well and good. But, in any case, no one of the above-named requisites can be neglected without great disadvantage.

Royal Manchester Institution.—The Exhibition of modern paintings and works of art here will be opened to the public on Monday, the 13th inst.

BOLTON SEWERAGE: PROPOSED INTERCEPTING WORK.

For a long period much agitation has been going on in Bolton on the subject of the outfall of the sewage. We are at last glad to find there is a probability of the work being carried out under the pressure of the powers possessed by the Home Secretary, as Mr. Lawson has just decided between the rival plans suggested by the engineer, and the Sanitary Sub-Committee. Bolton, it should be understood, contains a population of 70,000 inhabitants; the area of the borough is 1,840 acres, one half of which is drained. The river Croal, running through the town, takes 720 acres; the river Torge, 122 acres; and the Jemmy Bech, 73 acres; and the portion in dispute was the outfall drainage of the area falling towards the river Croal. The total quantity of the sewage of Bolton is 1,725,780 gallons, 7-8ths of which flow into the river Croal. The bed of the river Croal, we should remark, is pitched, for the distance it passes through the town. According to the engineer's report (February 4, 1867), it appears that all the sewers are so constructed that the sewage can be intercepted at any period. The proposed outfall sewers have been so designed as to intercept all the sewage of the town, and to carry it outside the borough a distance of one mile and three-quarters (measured along the river course), from the Market House.

From the proposed point of exit it is intended to make a sewer, 5 ft. by 3 ft. 9 in. of uniform shape, along the right bank of the river to the sewer discharging at Rosehill; from Rosehill a sewer of reduced size, 4 ft. by 3 ft. to the new sewer at Church Wharf; from thence one of 3 ft. 9 in. by 2 ft. 9 in. to Water-street; from thence a circular sewer of 3 ft. diameter to Great Bridge; from thence a circular sewer of 2 ft. 6 in. diameter to Gilrow-lane, and terminating with a sewer of 2 ft. diameter at Pike's-lane, the total length being 3 miles 270 yards.

At Pike's-lane he proposes to form a flushing tank, with sluices, &c., complete, to flush out the whole length when necessary, and also at this point to erect a chimney-shaft and furnace for the ventilation of the sewers, as it is the highest point.

It is also intended at all convenient points along the course of the outfall to construct storm overflows to deliver excessive rainfalls into the river and these overflows are to be trapped.

Manholes are to be placed at frequent intervals, and junctions left at such places as may serve for the drainage of the land and houses, when built upon. The estimated cost of the proposed works is 13,684*l.*

The general inclination of the sewers varies from 1 in 43 to 1 in 326, except in one instance, which is 1 in 12.

No scheme is at present recommended for the ultimate disposal of the sewage, as, in consequence of the great sacrifice attending experiments in many places, and the failures that have occurred, the engineer has been deterred from doing so; but he has watched for a long period the progress of sewage utilisation works in other places, a list of which he gives. At Leicester, Exeter, Uxbridge, Ely, and Clifton, deodorisation has proved a failure. At Cheltenham and Coventry a system of filtration has proved only partially successful. At Hitchin and Blackburn, precipitation has proved a failure at the former, and at the latter place it has only been recently adopted. At Croydon, Rugby, Edinburgh, Tavistock, Harrow, Crediton, Pusey, Clipstone, Banbury, Watford, and Carlisle, irrigation has been tolerably successful; but at Croydon, systems of precipitation, filtration, and deodorisation had been previously tried, but each had proved a failure.

Upwards of fifty patents for dealing with town sewage had been taken out, and there is no instance on record of any one having been successfully applied. At Croydon, it is stated that until recently the disposal of the sewage cost 3,000*l.* a year, but at the present time a profit of about 300*l.* is made by it. There are 350 acres of land irrigated by the Croydon sewage, and the profit realised is said to be 1*l.* per acre.*

The report was submitted to the sanitary committee, and one member, the mouthpiece of that body, opposed the plan, and suggested a crude and undigested scheme, as will afterwards appear, of their own, as more economical.

From Great Bridge they proposed to take up the pitching of the river bed, and reduce it in

* This system is said by some to produce the foot and mouth disease now prevalent amongst cattle.

width from 6 ft. wide by 19 in. deep, to 4 ft. wide by 15 in. deep, and to lay an iron pipe of 16 in. in diameter in the line of the river underneath the invert. This iron pipe, of 16 in. diameter, was to take the sewage of twenty drains, between Great Bridge and Water-street, the sectional area of the sewage being stated to be 45 square inches, the sectional area of the pipe being estimated at 256 square inches. From Water-street to Bridge-street, to take the sewage of eleven additional sewers, computed at 69 square inches, they proposed a 20-in. pipe, of 400 square inches area, to take the united quantities of the above sewer, calculated at 114 square inches of sectional area.

From Bridge-street to the weir at the wharf they propose to lay down a 24-in. pipe, the sectional area of which is 576 square inches, to convey the sewage from the thirty additional sewers which discharge into the river between these points, the flow of sewage from which they estimate to be 84 square inches, and which, added to the former quantities, gives a sectional area of 198 square inches. From the wharf to Messrs. Marsden's Bleach-works, they proposed to lay down a pipe of 30 in. diameter, the sectional area of which is stated to be 900 square inches, to convey the sewage from six sewers, of 176 square inches area, making the total quantity of sewage 374 square inches. In other words, as they say, to provide an outfall sewer of 900 square inches, to take the whole of the sewage, which is estimated at 374 square inches. The large pipe is to be cast in 6-ft. lengths, in two pieces horizontally, and secured by flanges and bolts in the centre. To connect the present large street sewer with the intercepting pipe, they propose to use pot-pipes of just sufficient size to take the ordinary drainage, and at these points to have (*unique*) storm overflows, to take the rainfall into the river.

They also provided for a system of ventilation, *approved of by Government* engineers (?) of 4-in. pipes affixed to, and carried up above, the roofs of the houses; and a plan of flushing by means of slide valves fixed to the pipes.

They state that the estimated cost of these works is 4,966*l.*, or say 5,000*l.* The size and weights of the pipes are as follow:—

Diameter.	Cwt.	Cwt.	Qr.	Lb.	
16 in.	1,098	or 2	2	20	per yard.
20 in.	881	„ 2	1	12	„
24 in.	2,318	„ 4	0	0	„
30 in.	5,690	„ 5	0	0	„
Branch pipes, &c....	99	„	—		—
Total weight...	10,086 required for the pipe sewer.				

We may in this place point out the errors in the calculation in the latter report, as must be self-evident to the veriest tyro in the profession. First as to the area of the pipes,—

	Pipe.	Sq. In.		Sq. In.
Instead of a	16 in.	= 256	should be	201·06
Ditto	20 in.	= 400	„	314·16
Ditto	24 in.	= 576	„	452·39
Ditto	30 in.	= 900	„	706·85

In estimating the quantity of sewage, the question of the velocity of flow appears to have been altogether omitted,—a very important element in estimating the amount of a dischage in these days of hydraulic engineering.

And with reference to the weight of iron and the estimate, we must add 50 per cent. to the former, and about 75 per cent. to the latter, to be nearer the truth, which would very much augment the totals of weight and price.

The report above mentioned was reviewed by the engineer (March 11, 1867), its errors of calculations as to quantities of sewage and acres of pipes pointed out, also the estimate of cost; and it was not until the inhabitants of the district affected by it took up the case, and petitioned the Home Secretary for the purpose of putting the Local Government Act on "Pollution of Rivers" in force; and that Mr. Arnold Taylor was sent down, and the result of his inquiry was to approve of the scheme of the engineer, and to condemn that of the committee in unmistakable terms, and his recommendation was pressed on them by Mr. J. Taylor, of the "Local Government Act Office."

To evade this, they proposed another *economical* scheme, viz., "a double line of iron pipes, one on each side of the pitched invert of the River Croal, and this was referred to the Home Secretary, who objected to it, and referred them to the original plan of the engineer, and gave them notice under the Act that if they did not proceed with the works, he should take the necessary steps to do so; but he was urgently requested to postpone it, in order to enable them to consult *another* engineer to decide these knotty questions, and Mr. Lawson was instructed to make the necessary investigation.

Mr. Lawson, in his report, points out the merits and defects of both plans; and one question, he says, is to settle the point as to the time the overflow shall come into action, and the sewage be allowed to escape into the river Croal.

Mr. Lawson thinks that neither plan on that head will have full effect, that the sewage after the first rush of water from heavy rain contains a great amount of filthy deposit, and that *ten* times the amount of the ordinary sewage is required to effect a perfect clearance, say ten times 1,500,000 gallons, equal to 15,000,000 gallons. If it is intended that the river Croal shall be purified, the engineer's scheme is ample, and that of the committee *somewhat small*, and both plans would fail as the overflows are arranged, and the committee's plan is besides impracticable. He is of opinion that substantially the plan of the engineer is the best, as affording facilities for regulating the flow, and better calculated for future requirements. He then proposes reduction in the sizes of the smaller sewers to 3 ft. 6 in. by 2 ft. 6 in., 3 ft. by 2 ft. 6 in., 27 in. diameter, and 24 in. diameter, and overflows to be so fixed as to discharge the flood water above mentioned, and so constructed as to be capable of adjustment. He then incidentally recommends depositing tanks to relieve the sewage of a portion of its solid matter. He also points out the errors of the calculations of the sub-committee, both as to the area of the pipes and the sewage flows, the latter arrived at without reference to its velocity. Thus, it appears after two years and a half, or more, of discussion and agitation, the plan of the engineer is substantially to be carried out, after a small reduction in the sizes of the sewers.

ERWIN VON STEINBACH AND HIS WORKS.*

CHRONICLE and legend have inseparably associated with the name of Steinbach that of his daughter Sabine in the production of one of the noblest monuments of Gothic art in Europe. That much of the more delicate and elaborately executed sculpture is due to her chisel there appears to be little doubt, and her personal beauty is also a feature in the traditions which have made her name that of the chief heroine of Mediæval art. A complete romance has, in fact, been embroidered upon the canvas supplied by her story, the main features of which have possibly their foundation in truth. As an example of the kind of material which the art-career of Sabine, as told by tradition, has furnished to the novelist, the following half-legendary anecdote may be cited. The story is thus told; Bernard Sunden, a young Silesian sculptor of average promise, who was engaged, like many others, in carrying out the designs of Erwin, became deeply imbued with an enthusiastic admiration of the beauty and artistic talents of Sabine, who was, however, too closely wedded to her art to listen to declarations that might in any way distract her attention from it, or retard the progress of the work, in which she was aiding to raise a monument to the glory of her father, by forwarding the completion of his great design. There was also, as usual, a rival, one Polydore of Boulogne, a young French sculptor, from the plains of Picardy, in whose ardent nature the charms of Sabine had developed a similar but far more violent passion than that which had stirred the breast of the more passive Silesian, who found consolation in the genial though quiet routine of his professional pursuits. It soon, however, became evident to the watchful and jealous eye of Polydore, that while Sabine did not allow her attention to be diverted for a moment from the ardent pursuit of the art to which she had devoted all her energies, she yet seemed to favour the pretensions of Bernard by allowing him to assist her occasionally in the works on which she was engaged. Matters stood thus at the time that she was near completing some conspicuous figures and elaborate enrichments above one of the principal portals. In this special work Bernard had been allowed to assist, and the last finishing touches having been given just as daylight began to fail, the protective hoarding was removed after dark, in order that the newly-finished portion of the work might be seen as a pleasant surprise by the public spectators. This state of things soon got wind,—the evening's gossip spread it far and wide; and when the following morning arrived, and many hastened to the place to see the newly-exposed work, great was the surprise and consternation experienced on finding the whole of the figures and ornaments mutilated and disfigured, beyond, as it seemed, the possibility of repair. Some considered the act that of the incarnate fiend himself, who, it was averred, had more than once sought to interrupt and retard the building of the temple; but others shrewdly attributed the work of destruction to Polydore, whose ill-concealed rage and jealousy since Sabine had accepted the aid of Bernard, seemed to know no bounds; and moreover he did not appear at his usual post that day, nor on several succeeding days. But then comes the miraculous part of the story. It was said that Sabine had had a vision in the night, in which she was promised celestial aid in the restoration of the mutilated work, and that in the morning she had discovered a beautifully drawn out plan for the repair of the work, upon her little table in the window niche of her bedroom. However this may be, say the relators of the tradition, the mutilated work was found partially restored on the morning following the vision, according to the design furnished to Sabine, and each night still further progress was made. Many were induced to believe, such was the beauty of the restored portions, that they were the work of angels, who had wrought under cover of the darkness; and it was asserted in corroboration, that the blows of a mallet, as though striking upon a sculptor's chisel, had been heard in the dead of the night, when every other sound was stilled. These reports and surmises appeared to be borne out by the rapid and continuous progress of the restorations themselves, accounts of which spread far and wide, till it was evident that another night's operations of the supposed celestial sculptors would complete the work, with even more perfect beauty than it had originally possessed, though even then considered the masterwork of Sabine. At this juncture it was said that Polydore had been again seen in Strasbourg, and Bernard, who believed that the Bolognese sculptor had more to do with the mutilation than the foul fiend, determined that night to set himself to watch the work, notwithstanding many pious scruples on the score of interfering with the work of the angels, and also some dread of the devil, who, in spite of his suspicion regarding Polydore, he still thought might possibly be at the bottom of the work of destruction, and perhaps ready to recommence it after the miraculous restoration. His scruples and fears being, however, both overcome, he proceeded to the scene of his nocturnal watch, where, contrary to expectations and fears, nothing occurred to vary the monotony and stillness of the darkness till nearly midnight, when he thought he distinguished, coming from the sculpture of Sabine's portal, slight sounds like those of a chisel struck gently by a mallet against stone or marble; but the sound was very faint, and he persuaded himself it was only fancy, the more especially as he had not the amount of courage requisite for approaching the spot more closely. He had, however, placed himself at the precise spot at which a human enemy was most likely to make his way to the part of the scaffolding in question—and this point he thought it his duty to guard,—though he was not prepared to contend with an enemy of more mysterious nature. But this was not the only point of possible approach, and he just then clearly distinguished the creaking of a plank on the scaffold itself, leading to the stage in front of the miraculously restored wall. Almost immediately after, his eyes having become sufficiently accustomed to the darkness to distinguish dimly the forms of objects in favourable positions, he discerned a dark form, the outline of which was rendered tolerably distinct against the lighter colour of the new stonework. The form appeared to be unmistakably that of Polydore, and it glided along the scaffolding towards the point he was so anxiously watching, and where he had heard the sound. Then came another slight blow, like that of a mallet, and a fragment fell upon the stage below, and immediately after a white object appeared gliding round the projection of a buttress. The dark figure turned towards the new apparition, and started back upon the narrow scaffold as though in sudden terror. Then came a sound like that of a heavy mass falling to the ground, followed by what seemed like a sigh, or a groan. Bernard, whose gaze had been riveted upon the white form that glided out of the shade of the buttress, soon perceived that it was not that of an angel, as he

* See p. 679, *ante*.

had at first supposed, but simply a slight graceful human figure, and in an instant he was on the planks of the stage above; for he knew every ladder and every intricacy of the scaffolding, and was just in time to catch the falling figure of the somnambulist, Sabine, who had been pursuing her dream work, and was in the act of returning, when the noise of the fall which had just taken place had suddenly roused her from her trance, and but for Bernard's timely arrival she would have fallen to the ground. The simple explanation was that the destruction of her work had preyed upon her mind in dreams, under the influence of which she had glided safely, night after night, to the scene of the devastations, and had, in her sleep, effected those restorations which the peculiar spirit of the times had so readily attributed to supernatural intervention. Sabine's impression, that she had been favoured with a divine vision, combined with the excitement of her religious enthusiasm, may have induced both the acts of simple somnambulism, and also her nocturnal labours at the injured sculpture; and this explanation has been very successfully suggested and expressed by M. Grasse, in the well-conceived statue before alluded to; in which she is made to hold a prayer-book in one hand, while with the other she grasps a mallet and chisel, which she presses to her breast, as though she felt that the instruments were imbued with a miraculous power, by which their action would be guided, rather than by the skill of her own hand. This story, whether wholly or only partly true, has taken a strong hold upon the literary and artistic men of Germany; and, as previously stated, a German novel-writer has made Erwin and the progress of his great work the subject of a graceful and very graphically treated fiction,—in which, of course, Sabine occupies a prominent place. There are many such legends, partly true and partly legendary, associated with the erection of the great ecclesiastical edifices of the Middle Ages, showing us that architecture is very far from being without its romance.

The great artist-mason, with his sons and daughter, continued the work together till the beginning of the fourteenth century, by which time the fame of Erwin and the renown of his cathedral had spread to other parts of Germany. In Strasbourg he was styled *gubernator fabricæ ecclesiæ argentinus*, and he was also more familiarly styled *hüttenherr* and *werkmeister*; generally considered to express "engineer" and "principal architect." One of the consequences of the successfully carrying forward of so vast a work at Strasbourg led to the nomination of that city as the seat of the principal Masonic guild or lodge of the Free Society of Masons, and it may be that his title of *hüttenherr* had reference to his being elected master in chief of the Germanic lodges, as the German common term for a lodge was *hütte*, the Strasbourg lodge becoming the *haupt-hütte*. Another consequence of the widely extended repute of Erwin of Steinbach was, that the aid of his fertile invention in design and skill in construction was called for in various quarters; the principal works which he designed or executed beyond the walls of Strasbourg being the graceful church of Thann and great part of the cathedral of Freyburg, including its elaborate spire.

Thann.—Thann is a beautifully-situated little town nestled close to one of the narrow valleys of the Vosges Mountains, and, with its elegant Gothic church, forms such an exquisite picture, with its ancient houses and mountain background, that a painter in transferring the scene to canvas would scarcely deem it necessary to either heighten or subdue a single feature. At the first aspect of the beautiful spire of Thann the student is at once satisfied that the traditions and records which attribute the erection of the church to the architect of the great work at Strasbourg are no myth, for the whole structure is plainly enough stamped with the true spirit of Erwinian design. The elegant steepled tower is at the southern angle of the east end of the building, and is furnished, like the tower of Strasbourg, with external winding stairs, cased in a spiral shell of open-work, all the way to the top of the lofty tower, from which rises the elegant steeple, supported at its springing by the slenderest and most fanciful of flying buttresses; the steeple itself being perforated with open-work, light and beautiful as a richly-traceried window of delicately intricate design. The whole composition is, indeed, unmistakably from the same hand as the tower and steeple of Strasbourg, of which the perforated staircase turrets at the angles form so remarkable a feature. The south portal is a marvellously-beautiful example of lofty and elegant proportion, wrought out with the richest conceivable details; the capitals of the slender detached columns forming corbels for small statues, remarkable for their graceful execution; and above which are delicately-perforated canopies, surmounted by pinnacles, as light and slender as lacework. The double western portal is also quite a masterpiece, and altogether exceptional in regard to its elaborate and minute enrichments; while the exquisite touches of sculpture encrusted upon and about the buttresses are of very remarkable elegance and most ingeniously devised in regard to appropriateness of attitude in reference to situation. In short, the western façade is a perfect jewel of elaborate art,—the amount of finely-designed patterns, of minute perforated work and lacy canopies, being perfectly astonishing. Part of this work appears to exhibit manipulative touches of a later period than that of Erwin; but the main features and the distribution and proportion of the general elevation, as well as all the principal enrichments, are indubitably due to his fertile and graceful invention.

The interior is by no means so remarkable as the exterior; but its exquisite lateral chapels, with their elaborate and interesting stone altars, should, nevertheless, be carefully examined; especially one of the fourteenth century in the chapel of the Virgin, which is a masterpiece of its class; its intricate tracery, and delicate pinnacles and tabernacle work, being of the most highly-wrought kind. Another chapel, also, contains a stone altar marvellously rich in florid decoration, the deep panels being entirely filled with richly wrought interlacings of foliage; one having vine branches with large bunches of grapes, another fig branches and figs, and the others different foliage and fruits, equally rich in design and treatment. There is also another very splendid altar in the southern aisle, which, however, has been so elaborately restored, that it has acquired somewhat the stamp of the modern Gothic of the Munich school, and lost much of the charm of the original manipulation. The groining of the ceiling of the south aisle differs from that of the rest of the church, and is very distinct and characteristic in its style.

How much of the work of this elegant structure may have been executed in Erwin's own time it is difficult to say. But it is known that the works were proceeding during the time that his son and successor, Jahn, was still directing the works at Strasbourg, though much of the work was evidently executed at a later period, as proved by a passage in a local chronicle, which states that the building of the church was still going on in the year 1431, when the wine produced along all the eastern slopes of the Vosges was so abundant that during a drought which occurred in the autumn of that year it was used instead of water to prepare the mortar used in carrying on the building of the church. Nevertheless, it is stated in the chronicle in question that the building was from the design of Erwin, of Steinbach.

Freyburg.—The same chronicle also states that Erwin was likewise the architect of the cathedral of Freyburg, of which there is also sufficient evidence of other kinds to leave little or no doubt upon the subject. The cathedral of Freyburg is a much more important building as to scale than that of Thann; but the style of the spire resembles the one at Thann more than that of the Strasbourg edifice, which last, however, it nearly rivals in height. The portal of the cathedral is fine in form, but not greatly enriched with sculpture, the abundant smooth surfaces appearing to have been provided expressly for polychrome treatment by painting, as was more the custom in this part of Germany than in Alsace; and the columns and mouldings are accordingly painted in the usual Mediæval style, with geometric or slightly foliaged patterns. The first porch leads to an inner one, or "Paradise," as it is termed; the walls of which are enriched with arcade work up to a certain height, and then corbels rise between the arches, starting from immediately above the columns, and supporting a series of statues which are surmounted by elaborate canopies, the general effect being rich and picturesque. The main interior is not comparable in any way to that of Strasbourg, but is yet very good, and certainly attractive in its general aspect; and there is a particular statue, against a massive group of columns, which produces a remarkably picturesque effect, on account of a delicate spiral canopy rising to a great height above it, rich with the most profusely elaborate decorations. It should be observed that in examining the numerous statues with which the interior is enriched, none can fail to detect, not only the same handling as in the sculpture of Strasbourg, but also the same faces as those of the "wise and foolish virgins" previously described, and must feel convinced that the cunning hands of Erwin and his daughter Sabine have been at work upon them, and that Sabine's own face and figure are faithfully reproduced in more than one of the statues of female saints in the cathedral of Freyburg. The pulpit is a very remarkable work, but appears of somewhat later date than the productions of Erwin, though the design itself may be his; for it bears a strong likeness to that of Strasbourg, which, though executed by Hammerer, and with certain additions said to have been suggested by the great preacher Keysersperger, is yet known to have been originally designed by Erwin. The ceiling of the choir appears to have been completed in 1410. The three eastern altars at the termination of the nave and aisles are of very rich tabernacle work, which might belong to the end of the fifteenth or beginning of the sixteenth century; but, then, in the profusion of decorative features, and in the intricacy of the decorations themselves, Erwin was so much in advance of his contemporaries that for fully a century afterwards his followers had enough to do to work up to the point he had previously reached, without dreaming of going beyond; and this may account for some of the work, even of his own hand, being attributed to a more recent period; for his original genius developed a daring advance of style, which was not only accepted by his contemporaries, but followed by his successors. It will not be without interest, while describing this interior, to call attention to the work of a modern emulator of the decorative style of Erwin, namely, the throne of the archbishop,—a rich composition of tabernacle work entirely carved in sycamore wood, or box, which has assumed a most beautiful golden tone, of almost metallic effect. The work is most delicate and intricate, and the carver stipulated, before parting with the result of his labour, that it should never be either *gilt* or *painted*; and, not content with promises, he had a deed drawn up to that effect, which was willingly signed by the venerable archbishop, now above 90 years of age. The artist's family possess the Deed, regularly drawn up on parchment, and signed by the archbishop, both for himself and his successors. The idea was probably suggested to the modern carver by the three altars which are entirely gilt, so that the spectator cannot guess whether they are of wood or stone—or even gilt iron, which they might very well be taken for, on account of the delicate slenderness of their features, did we not know that Erwin treated stone, even in external decorations, with such excessive slenderness and attenuation of the more delicate features, that the proportions are positively more like ornaments wrought in metal than carved in stone.

The windows of the choir are fine in general form and proportion, but the tracery does not seem to present the Erwin *cachet*. In fact, the windows are of various dates in this structure; some of those of the original Romanesque chevet remaining, and also some of the Early Lancet period, which are by no means good specimens of the style. The famous windows with the painted glass presented by the different trade guilds of the city in the thirteenth, fourteenth, and fifteenth centuries, form a very interesting series; they are large, and their tracery simple, and they seem to belong to the close of the thirteenth century. The paintings they contain are each enriched, as a main feature, by the armorial bearings of the respective guilds; the bootmakers' shield having a yellow field, representing gold, and bearing in the centre a black loose boot turned over at the top with red. The shield of the brick and tile makers bears an object which may be called a brick or tile; that of the smiths a hammer and pincers; that of the tailors a pair of open scissors; the bakers, an unmistakable loaf; and the weavers, a shuttle. The window of the Vinedressers' Company is perhaps the richest in its general pictorial subjects; but all are very interesting monuments of local art, and all more or less good. The windows above these are undeniably the work of Erwin, and their forms are stamped with his peculiar elegance of proportion and design.

But it is the exterior, perhaps, that exhibits the Erwin style more conspicuously. The grand

and at the same time elegantly perforated spire, in the style of that of Thann, rises from a lofty tower, the upper or second story of which is of the most delicate design, highly enriched with a profusion of the tall and slender panel, niche, and open-window work, for which the style of Erwin is so well known. It is probable that Erwin's work, in the tower, commences with the second story, as a marked change of style takes place at that point. Two lateral towers near the entrances of the present transept are parts (still perfect) of the original Romanesque structure; but both are crowned with two upper stories of Erwin's work. The whole of the choir was probably an addition to the ancient Romanesque edifice, and the greater part of it, containing all the more decorative portions of it, are from the hand of the great mason of Strasbourg. The buttresses of that portion of the building, with their connecting gallery work, are extremely rich in ornamentation, which is exquisitely varied in its detail; and the profusion of richly-canopied niches, with their appropriate statues, is most remarkable. There is, especially, an equestrian statue surmounted by a delicately-enriched canopy, in the style of the equestrian statues of Clovis and Dagobert at Strasbourg, which at once attracts attention. In short, the beauties wrought out at Freyburg are almost as remarkable as those of the more famous cathedral at Strasbourg, and are just as indubitably the work of Erwin of Steinbach.

The works, or at all events the preparation of the designs, had been going on simultaneously with those of the master-work of the great sculptor-architect, whose unceasing industry was busily plied in his *atelier* close to the cathedral at Strasbourg during twenty-eight years, where he died in 1304, after having established a more brilliant and widespread reputation as a successful and unrivalled architect than had been achieved by any of his predecessors in Germany.

Erwin's tomb may be seen close to the cathedral, in a little court attached to the chapel of St. John the Baptist, the epitaph giving him the titles of Hüttenherr and Werkmeister previously referred to. It is intended to remove it eventually to a conspicuous place in the interior of the cathedral itself, as near as possible beneath his sculptured portrait, which appears to look down from an upper gallery. In the mean time another memorial has been erected in memory of the great artist-mason at Steinbach, his native village, among the vineyard-clothed hills on the borders of the Black Forest. The village itself, which was visited by the writer of this notice, possesses no remarkable features, no interesting old houses, and especially not one that could with any show of probability be pointed out as the birthplace of Erwin. Moreover, there was not in the place a suitable site for a statue. But on a neighbouring hill, at the highest point of a finely undulating vineyard, is a spot from whence the distant spire of Strasbourg may be seen or imagined, and on that spot a statue has been placed, which appears to look intently towards the marvellous work which the man it is intended to honour conceived and planned with such consummate skill. The attitude of the statue is well designed, and as well executed. It is, indeed, a worthy tribute to the memory of a great artist.

The fame of Erwin and his work continued to spread even after his death, and his son Jahn was with universal acclaim appointed to carry on the great work at Strasbourg towards completion; Sabine appearing to have been appointed, conjointly with her brother, to direct and carry forward the execution of the decorative portions of the building. Jahn continued the work with vigour for even a longer period than his father—viz., for five-and-thirty years, from 1304 to 1339, when he died; and doubtless very great progress had been made at the time of his death.

His sister Sabine, according to the legendary accounts of Erwin and his family, became the wife of Bernard of Sunden, and eventually settled with him in the North German provinces, where they produced many works of note, especially a great portion of the chevet at Magdebourg, in the decorating of which they reproduced several of the groups and figures which they had worked upon together at Strasbourg; the style of the sculptors in question appearing to render the tradition probable.

Wynkin, the younger son of Erwin, also became celebrated as an architect, and built the collegiate church of Hasselach, in the duchy of Baden, where he died, and where a tomb was erected to his memory, which is still in perfect preservation.

After the death of Jahn, Hültz, of Cologne, one of the most rising architects of the day, was called upon to continue the great work at Strasbourg; but he only lived ten years after his appointment, yet, in that time, as the tradition goes, supported by contemporary records, he completed the exquisite steeple according to Erwin's design, and raised the repute of the cathedral and its original architect to its highest pitch, insomuch that Strasbourg was finally acknowledged as the seat of the chief Masonic Lodge of Germany. After Hültz several other architects succeeded each other, but at last Josse Dortzinger, of Worms, was appointed to carry on the works, and his competency soon approved itself by the continued rapid progress of the building, the influence of which on architectural art throughout Germany became more and more apparent, and it was under his leadership that in 1452 the various lodges of Germany banded themselves together in one association, the chief of the Strasbourg Lodge, Dortzinger, being appointed its permanent head, to be succeeded by his descendants. Representatives of all the lodges met at Ratisbon on the 25th of April, 1459, to draw up formal articles of association, the various secrets and signs and other forms being agreed upon at that meeting.

Dortzinger appears to have died in the year 1486, after carrying forward Erwin's vast design for 36 years, the work having then lasted with little intermission, for 147 years after the death of the younger Erwin. Hammerer and Larschut succeeded Dortzinger as architects of the cathedral from 1486 to 1495, and then came Conrad Waght, who in 1498 obtained a ratification of the Masonic articles of association, confirming them in the possession of considerable judicial powers in the settlement of all disputes in matters appertaining to building transactions,—privileges which were subsequently subscribed by Charles V., and which remained in force for more than two centuries.

In concluding these remarks on the great mason-architect Erwin and his family, and on the progress and contemporary celebrity of his greatest work, it may not be without interest to recall the fact that in 1481 the Duke of Milan, wishing to complete the noble cathedral of that city, a work not inferior in celebrity to that of Strasbourg itself, wrote on the 27th of June, 1481, to the chief magistrates of Strasbourg, asking from them, on the faith of their own celebrated temple, an accomplished mason capable of completing the great rival cathedral of Milan; and from its peculiar style, so distinct from any other great Gothic edifice in Italy, it appears probable that one or more architects responded to the invitation, and that those German artists had a leading share in imparting to it those forms of the Germanic Gothic which peculiarly distinguish it.

HILDESHEIM.

In addition to the works of art already described,* the choir of the cathedral at Hildesheim contains a superb set of stalls of fourteenth century work: the canopies and ends are beautifully carved; the stalls themselves are forty-two in number. The centre space of the choir is filled with two large cantors' desks and two lateral desks. Although this arrangement is probably not older than the seventeenth century, it is uncommonly picturesque, and, as far as we know, peculiar to this cathedral. The "sanctuary" is separated from the choir by three steps. In the centre of the sanctuary is the high altar, with a silver frontal, tabernacle and candlesticks; they are unfortunately of a very wretched design. On either side of the altar are doorways leading to the apse, which is screened off from the choir and sanctuary by an immense Italian reredos. Over these two doors are brackets supporting two most superb Early Romanesque shrines: one contains the bones of St. Bernward, and the other those of St. Godehard, or Gothard; they are both of silver gilt, set with precious stones, and are about 8 ft. long. The sides of St. Godehard's shrine are ornamented with an arcade of round arches supported upon little columns. Each of these arches contains the statue of a saint worked in high relief.

On the altar is a fine fourteenth-century bust of St. Catherine, in silver; on the credence-table is a copy of the Gospels made by St. Bernward in the eleventh century; and on the left of the high altar is a "Madonna and Child" of the *tenth century*. It is carved in black wood, with the faces and hands covered with plates of gold. Two horrible curly wigs disfigure this remarkable work of art.

The space at the back of the high altar forms a kind of treasury, full of most superb works of Mediæval art; amongst others, the following are perhaps the most remarkable:—The chalice of St. Bernward, ornamented with ancient classical cameos, on one of which are the three Graces; a magnificent chalice of the thirteenth century, with patern to match; a fourteenth-century pastoral staff, still used by the bishop; and many other articles of church plate. The cloisters enclose three sides of a square, to the east of the cathedral, the fourth side being formed by the apse and eastern sides of the transepts. These cloisters are of early Romanesque work, and are arranged in two stories, the lower composed of large single arches, and the upper of narrow arches, arranged in sets of three, separated by slender columns. In the centre of the cloister square is a beautiful little apsidal chapel of the fourteenth century, and leading out of the south walk is a Romanesque chapel, divided into four equal aisles by low columns and round arches. This chapel contains several very early monuments, and in it are deposited the remains of the superb incised pavement which once adorned the choir of the cathedral. Under the choir is a crypt of very early Romanesque work, on one of the altars of which is a fine ivory crucifix of the twelfth century, and fixed to the altar-rail is a singular bronze lion of the same date. The sacristy leads out of the south transept; it is, like all German sacristies, of very large size, and contains an altar dedicated to St. Thomas à Becket. Above the large porch called the New Paradise, is a large room divided into three aisles by lofty columns; it is a kind of treasury or museum, and is full of most interesting works of ancient art. Amongst other curiosities are the silver bust containing the head of St. Oswald, and a silver model of the original central tower of the cathedral. This tower, which is replaced by the present ugly dome, stood over the junction of the nave and transepts: judging from this singular model, it was probably of wood covered with copper or lead. Returning into the body of the cathedral, we must notice the singular and beautiful bronze font represented in our engraving. We gave a description of this font in the *Builder*, when speaking of the font at Wurzburg Cathedral: so it will be unnecessary to describe it again.

We must now leave the cathedral, and say a few words about some of the other churches in the town. The abbey churches of St. Godehard and St. Michael are most interesting Romanesque buildings. They have originally both possessed apses to the east and west, but the eastern apse of St. Michael's Church was destroyed many years ago, and the altar is now placed in the western apse. St. Michael's Church is one of the few churches which retain their ancient flat boarded ceiling with the coëval decoration, very similar to the work lately executed at Ely Cathedral by Messrs. Le Strange and Gambier Parry. There are some fine stalls, two old altars, a bronze font of fifteenth-century work, a fine thirteenth-century side screen to the choir, and some very interesting old paintings by an early Flemish painter. St. Godehard's Church is the noblest church in the town, and has been excellently restored. In the choir is a modern corona, copied from those at the cathedral, and an incised pavement, a restoration of the one which originally adorned the choir of the cathedral. This pavement is formed of a hard white composition, and figures, birds, beasts, foliage, and inscriptions are incised on it with lines cut in and filled with black and red mastic. The ancient rood exists, but is placed across the south transept. The western apse of this church does not contain an altar, as is usual in the double Basilica churches in Germany, but is divided into two stories, the lower of which forms a baptistery, to which there is a descent of several steps. The upper story opens into the church by a large arch, and is used as an organ-loft. There is a well-designed modern altar.

The remaining churches in Hildesheim are interesting buildings, but our space will not allow of our entering into any detailed description of them. St. Cross's is a large modernised Romanesque church; St. Andrew's, a lofty and very striking fifteenth-century building; St. Lambert's and St. Paul's are late Third Pointed; and St. Moritz's very Early Romanesque, with a later chancel: the whole building is terribly modernised.

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* See p. 689, *ante*.

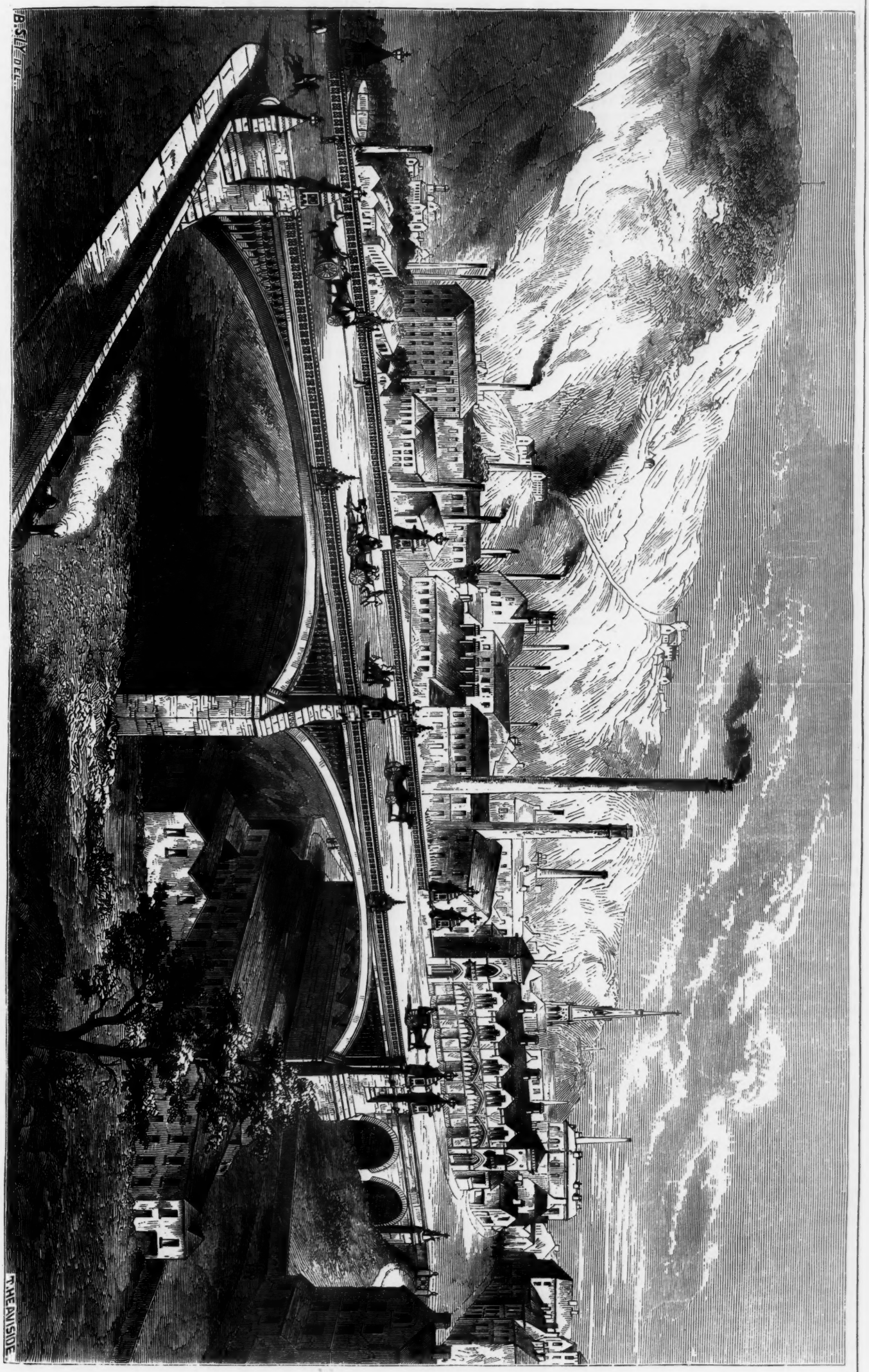
ANCIENT METAL FONT, HILDESHEIM CATHEDRAL.

THE NEW NORTH BRIDGE, HALIFAX, YORKSHIRE.

Halifax has made wonderful progress within the last few years, and many changes and improvements have been required to meet the altered circumstances. Amongst other things the old North Bridge has been found insufficient for the requirements of the present age, and a new structure is being erected in its place. The population of the town of Halifax in the year 1764 numbered about 6,500, and there were then, according to an authenticated return, 1272 inhabited houses. The present population of the town is about 57,000, with 11,000 inhabited houses, and the rateable value of the borough is 180,000*l.*—so considerably has the town grown in numbers, wealth, and prosperity. The first stone of the new bridge was laid on the 14th day of April last, by Mr. John Dyson Hutchinson, mayor of the borough. We now give a view of it as it will appear when completed.

The old bridge, which is of six arches, carrying a roadway 27 ft. wide, at a height of about 56 ft. above the level of the stream at the bottom of the valley, served its original purpose, and was useful in avoiding the steep and winding road formerly in use only by packhorses. Of late years, however, as we have said, the old bridge has been found totally inadequate to the requirements of the town, and the corporation, taking up the question with energy, determined upon having a new erection of increased proportions. Various schemes from time to time were suggested, and eventually Mr. John Fraser, civil engineer, of Leeds, was consulted. Ultimately a design for an iron bridge of two spans, 160 ft. each, and with a clear width between the parapets available for traffic of 60 ft., prepared by Mr. Fraser, was adopted. In designing a bridge of two spans, the engineer had several objects in view, one being to span over the station ground of the Halifax and Ovenden Junction Railway on the north side of the valley, now in course of construction, and also to clear some valuable property on the south side. Moreover, in a sanitary point of view, a light iron bridge of two spans resting on one pier is far preferable to a stone bridge with six arches resting upon five piers, as had been determined upon at one time, as forming a much less obstruction to the proper current of air so necessary for the ventilation of a steep and narrow valley. The new bridge has been designed in the Gothic style of architecture. The elevation shows two flat elliptical arches of 160 ft. span with a rise of only 16 ft. The outside ribs, which are of cast iron, are 4 ft. deep at centre, and 5 ft. 3 in. deep at the springing, and carry open traceried spandrels at the haunches crowned by a cornice and a partly open quatrefoil and battlemented parapet with a central feature comprising a shield for the corporation arms, with foliage on each side on a diapered background and terminated at the top with a lamp. The inside ribs, six in number, are placed at a distance of 8 ft. 7 in. apart. The centre part, for a space of 52 ft., is composed of wrought-iron plates, the remaining parts of the ribs being of cast iron. The transverse bracing connecting the wrought-iron part is composed of wrought-iron bars, but that connecting the cast-iron part is of cast iron. These ribs carry open cast-iron spandrels; upon the top flange of these are placed the cast-iron road-plates, the road being formed by layers of asphalte concrete, upon which the paving is laid. The total weight of the cast-iron work is 1,200 tons, and of the wrought-iron work 150 tons. The iron, made by the West Yorkshire Iron and Coal Company, has been selected after some experiments. The masonry of the abutments on each side of the valley and of the central pier will be finished by five spire-like terminations, which will rise 15 ft. above the parapet on each side of the bridge, and will carry large octagonal lamps to be supplied with gas for lighting the roadway. As a portion of the new bridge will stand upon the site of the old one, it is intended to build one half of the new bridge, and then to turn the traffic from the existing structure on to the new half. The present bridge will then be pulled down and the remaining half completed. The roadway of the new bridge, when completed, will be 11 ft. above the level of the old one; by this means a gradient almost level will be obtained from Cross Hills to the opposite side of the valley, at the junction of the Haley Hill and New Bank roads.

Mr. Archibald Neill, of Bradford, has undertaken the construction of the bridge and of a new road called Bridge-lane diversion, rendered necessary by the increased width of the approaches, for the sum of 21,000*l.* The ironwork is being furnished by Messrs. Joseph Cliff & Co., also of Bradford.



THE NEW NORTH BRIDGE, HALIFAX, YORKSHIRE.—MR. JOHN FRASER, ENGINEER.

PENS.

As the Pounds of our last little paper had no reference either to shillings or to pennyweights, so these Pens in the present have as little as possible to do with their usual and familiar accompaniments, ink and paper. We speak not of that great goosequill sceptre of rule which shares with the sword this broad world's sovereignty,—nor of that hybrid between both, the Magnum Bonum, or Gillott's Ne plus ultra,—but of a certain generation of smaller pounds, otherwise pens, whereunto is attributable no small amount of cruelty from man towards his humblest servants. Let it be the happy province of the *Builder* to advocate humanities even to the lowest, and to reform architecture even in respect of such unconsidered dwellings as many poor beasts and birds are compelled to live and die in.

We have in our mind's eye some certain matters in modern farming which appear to us pre-eminently cruel to the animals, and cannot be otherwise than conducive to disease in the meat they generate: as, the solitary confinement system of fowl-boxes, where the poor creatures have not room to turn nor the chance of ridding themselves of parasites, but, with only heads and tails exposed, fatten in unwholesome misery; and, still worse, as those pits into which a bullock is lowered and is fed therein week after week without air or exercise until he gradually reaches the level on the mass of manure he has been making, and finishes his dreary and pestilential existence by crawling for his first walk into the fresh field, an unwieldy mass for the shambles; and, more familiarly, as the very common case of the close, hot, filthy pigstye, or your dog-kennel in the sun, where poor Juno mournfully clanks her perpetual chain, while all things round are free; or your lark, thrush, bullfinch, or canary, cribbed, cabined, and confined in the smallest possible cages, and hung out in the hot sun.

Do let us, in these happier days of enlightened kindliness, give more consideration to all the poor dumb creatures round us. A kind heart and a modicum of common sense would cure more evils than we have time or space to enumerate. Larger, cleaner, better-shaded styes and kennels, with more frequent healthy "outings" for their prisoners; fowls fed in the open and not stewed-up in pens; cattle fattened in wholesome stalls and strawyards, not on subterranean dungheaps; with plenty of Nature's great free gifts, air and water, always accessible, and as much exercise and liberty and enjoyment of life to bird or beast as can reasonably be conceded. Depend upon it, such humanities are also economies. MARTIN F. TUPPER.

IMPROVEMENTS IN CAST STEEL.

IN an able address before Section G of the British Association, at Exeter, Mr. C. W. Siemens, F.R.S., thus spoke on this important subject. A great revolution of our constructive art has been prepared by the production, in large quantities and at moderate cost, of a material of more than twice the strength of iron, which, instead of being fibrous, has its full strength in every direction, and which can be modulated to every degree of ductility, approaching the hardness of the diamond on the one hand, and the proverbial toughness of leather on the other. To call this material cast steel seems to attribute to it brittleness and uncertainty of temper, which, however, are by no means its necessary characteristics. This new material, as prepared for constructive purposes, may indeed be both hard and tough, as is illustrated by the hard steel rope that has so materially contributed to the practical success of steam ploughing. Machinery-steel has gradually come into use since about 1850, when Krupp, of Essen, commenced to supply large ingots that were shaped into railway tyres, axles, cannon, &c., by melting steel in halls containing hundreds of melting crucibles. The Bessemer process, in dispensing with the process of puddling, and in utilising the carbon contained in the pig iron to effect the fusion of the final metal, has given a vast extension to the application of cast steel for railway bars, &c. This process is limited, however, in its application to superior brands of pig iron, containing much carbon and no sulphur or phosphorus, which latter impurities are so destructive to the quality of steel. The puddling process has still, unless the process of decarbonisation by Mr. Heaton takes its place, to be resorted to, and to purify these inferior pig irons, which constitute the bulk of our productions, and the puddled iron cannot be brought to the condition of cast steel, except through the process of fusion. This fusion is accomplished successfully in masses of from three to five tons on the open bed of a regenerative gas furnace at the Landore Siemens Steel Works, and at other places. At the same works cast steel is also produced, to a limited extent as yet, from iron ore, which, being operated upon in large masses, is reduced to the metallic state and liquified by the aid of a certain proportion of pig metal. The regenerative gas furnace, the application of which to glass houses, forges, &c., has made considerable progress, is unquestionably well suited for these operations, because it combines an intensity of heat, limited only by the point of fusion of the most refractory material, with extreme mildness of draught and chemical neutrality of flame. These and other processes of recent origin tend toward the production, at a comparatively cheap rate, of a very high class material, that must shortly supersede iron for almost all structural purposes. As yet engineers hesitate, and very properly so, to construct their bridges, their vessels, and their rolling stock of the material produced by these processes, because no exhaustive experiments have been published as yet fixing the limit to which they may safely be loaded, in extension, in compression, and in torsion, and because no sufficient information has been obtained regarding the tests by which their quality can best be ascertained. This great want is in a fair way of being supplied by the experimental researches that have been carried on for some time at her Majesty's dockyard at Woolwich, under a committee appointed for that purpose by the Institution of Civil Engineers. I have also pleasure to announce an elaborate report, by Mr. Fairbairn, on this subject. In the meantime excellent service has been rendered by Mr. Kirkaldy in giving us, in a perfectly reliable manner, the resisting power and ductility of any sample of material which we wish to submit to his tests. The results of Mr. Whitworth's experiments tending to render the hammer and the rolls obsolete by forcing cast steel, while in a semi-fluid state, into strong iron moulds by hydraulic pressure, are looked upon with great interest. But assuming that the new building material has been reduced to the utmost degree of uniformity and cheapness, and that its limits of strength are fully ascertained, there remains still the task for the civil and mechanical engineer to prepare designs suitable for the development of its peculiar qualities. If, in constructing a girder, for example, a design were to be adopted that had been worked out for iron, and if all the scantlings were simply reduced in the inverse proportion of the absolute and relative strength of the new material as compared with iron, such a girder would assuredly collapse when the test weight was applied, for the simple reason that the reduced sectional area of each part in proportion to its length would be insufficient to give stiffness. You might as well almost take a design for a wooden structure, and carry it out in iron by simply reducing the section of each part. The advantages of using the stronger material become most apparent if applied, for instance, to large bridges where the principal strain upon each part is produced by the weight of the structure itself; for supposing that the new material can be safely weighted to double the bearing strain of iron, and that the weight of the structure were reduced by one-half accordingly, there would still remain a large excess of available strength in consequence of the reduced total weight, and this would justify a further reduction of the amount of the material employed. In constructing works in foreign parts the reduced cost of carriage furnishes also a powerful argument in favour of the stronger material, although its first cost per ton might largely exceed that of iron.

The Visitors to the South Kensington Museum.—The number of visitors to the Museum proper last week was 17,437; more than 5,000 above the average of corresponding week in former years, and this has been the case for several weeks past. Considering the emptiness of London, this is the more noticeable. It affords a very conclusive answer to those who assert that the situation of the Museum puts it out of the reach of any but the well-to-do and upper classes of society, the vast majority of whom are at this time seeking health and change anywhere but in London.

THE WALLACE MEMORIAL MONUMENT, STIRLING.

THIS monument on the Abbey Craig, near Stirling, is now all but complete, and is to be handed over in a few days to the Town Council of Stirling, who have agreed to receive it in trust. Some 12,000*l.*, we are told, have been spent on it. It has been determined that no public proceedings shall take place on the occasion, which we regret, if only because they would have been made the occasion for a pleasant day by a number of persons. The friends of a Rev. Dr. in London have been setting up rather extraordinary claims on his behalf as originator, while different things are said by others equally acquainted with the history of the affair. We do not find it desirable, however, to go into the question. Whether personal matters of this kind have had anything to do with the determination arrived at we scarcely know.

A view of the monument, which was designed by Mr. J. T. Rochead, architect, will be found in our volume for 1860.* It is 220 ft. high, and 36 ft. square at the base, and enjoys a fine position.

A CHANNEL RAILWAY.

THE exceeding importance which is attached by many persons to the idea of a continuous railway across the Channel may be judged of by the numerous projects which have from time to time attracted the attention of the public, and which involve some of the most remarkable schemes of modern engineering. To minds unaccustomed to follow the progress of science in the present day, it would at first sight appear to be an impossibility to connect by a continuous line of railway the opposite sides of a sea nearly twenty miles apart; but we have seen three cables stretched across the Atlantic; we find one railway ascending the hitherto almost inaccessible heights of the Alps, and another penetrating through them; and we are about to witness the realisation of what has long been considered by able engineers an impracticable dream, viz., the opening of the Suez Canal.

To span the Straits of Dover is not more contrary to experience than any of these realised projects, and the numerous plans for effecting this object sufficiently attest that if it could be done it would yield to none in importance and value. It would afford a line of railway over which the traffic of the world with Britain would pass.

Such a railway must be made either by means of a bridge above or a tunnel below the water; and supposing both to be practicable, there can be no doubt that most people would rather pass over it by a bridge than under it through a tunnel thirty miles long; but objectionable as such a journey would be, the desire for a connecting railway is so great that it would probably be made through a tunnel if no better means of accomplishing it could be discovered.

We are led to make these reflections by a report which has recently been made by Capt. Tyler to the Board of Trade, which throws some light upon this very subject. A deputation had previously waited on Mr. Bright, and represented to him that the French Government were desirous of having the co-operation of the English Government in determining on the best course to adopt for effecting a railway communication between the two countries. We are glad to see that Capt. Tyler does not hesitate to recommend that the whole matter should be referred for the consideration of the French Government with a view to the appointment of an international commission for the purpose of dealing authoritatively with the important interests involved, and satisfactorily deciding the general question.

It appears from Capt. Tyler's report, that of the various projects which have been proposed, "those which have of late made the most progress are the bridge scheme of M. Boutel, and the tunnel scheme presented under the chairmanship of Lord R. Grosvenor." The British Government has been at great pains to ascertain their practicability, for it has referred the latter to three commissions of inquiry, and "the Council General of Mines, to whom the question was last referred, concluded that in the present state of things they would not form any estimate either of the probable duration of the works or their cost."

Of M. Boutel's bridge, Capt. Tyler reports that an association has been formed for making

* Vol. xviii., p. 57.

experiments. Two small bridges have been built on his system, and arrangements made for a third, in two spans of half a mile each; and that the emperor visited the works, on a site which has been granted by the French Government, and is stated to have expressed himself favourably with regard to the project. The bridge is intended to cross from Dover to Blanc-nez, near Calais, and is advocated as (1) being less costly than a tunnel, (2) occupying less time in construction, (3) giving no trouble in ventilation, and (4) avoiding the danger of sudden inundations. It is contemplated that the bridge can be completed in three years, and that the pending experiments give reason to expect that the estimate of 8,000,000*l.* will not be exceeded.

Capt. Tyler states, and truly, that there is nowhere a sea-service of equal importance which is so much in want of improvement, and we shall look with great interest for the result of the pending experiments in Paris which are being made by the direction of the French Government in reference to M. Boutel's bridge. Anyhow, the evils attending the existing modes of communication should be removed.

We are informed on good authority that the pending experiments in Paris are considered, so far as they have progressed, to be satisfactory.

BELLS AND CARILLONS, OR CONTINENTAL CHIMES.

OUR great musical historian, Dr. Charles Burney, in his interesting work, "The present State of Music in Germany, the Netherlands, &c." London, 1773, speaking of his visit to Courtray, says,—

"It was in this town that I first perceived the passion for *carillons*, or chimes, which is so prevalent throughout the Netherlands. I happened to arrive at eleven o'clock, and half an hour after the chimes played a great number of cheerful tunes, in different keys, which awakened my curiosity for this species of music so much, that, when I came to Ghent, I determined to inform myself, in a particular manner, concerning the *carillon* science. For this purpose I mounted the town belfry, from whence I had a full view, not only of the city of Ghent, but could examine the mechanism of the chimes, as far as they are played by clock-work, and likewise see the *carillonneur* perform with a kind of keys, communicating with the bells, as those of the harpsichord and organ do with strings and pipes. * * * * * *
The great convenience of this kind of music is, that it entertains the inhabitants of a whole town without giving them the trouble of going to any particular spot to hear it."

So far so good. The respected author then goes on to say,—

"But the want of something to stop the vibration of each bell, at the pleasure of the player, like the valves of an organ, is an intolerable defect to a cultivated ear; for by the notes of one passage perpetually running into another, everything is rendered so inarticulate and confused, as to occasion a very disagreeable jargon."

Now, having myself examined the bells and mechanism—*cylindre et clavier*—of the most celebrated *carillons* in Europe, and repeatedly listened to their music at various distances, I beg to assert most distinctly that the statement made by the learned doctor in the last paragraph is false. I deny that "everything is rendered inarticulate and confused," or disagreeable. On this point I speak the more plainly, because almost every Englishman who has written a line about *carillons* since 1773, has followed Burney's dictum, and told us that the great defect is the want of a damper to each bell. Several examples relating to Boston and other chimes have been contributed to public journals since Christmas last.

Perhaps the following observations may suggest what led the Doctor to entertain and publish the notion just mentioned:—

Every musician worthy of the name knows that instruments strung with wire "which have nothing to stop the sounding-strings, make an intolerable jangle to one that stands near," as, I may add, bells do to one that is *in the bell-chamber*, and hears the continuing sound of dissonant tones. Such an instrument of the wire-string kind is the dulcimer. But the pianoforte has a simple contrivance—a damper—for stopping the vibrations of the strings when the fingers are lifted from the keys.

If, then, instead of going to a spot at some convenient distance from the tower, as he ought to have done, with a view to "inform himself in a *particular* manner" concerning *carillon music*, Dr. Burney stood *in the bell-chamber* during a performance, the effect must indeed have been intolerable to a cultivated ear.

I maintain, however, that musical bells suspended in a tower, require no damper whatever; for, when their sounds have issued from the openings in the sides of the building, they spread themselves in the air, and ultimately reach the auditor with precision in subdued and pleasing tones. Even rapid passages in *carillon* music, if properly harmonized so as not to weaken or confuse the melody, and executed by, or upon, a good instrument, produce an admirable effect.

It would be well if the vibrations of many noisy and discordant things called bells were completely stopped. But to say that *musical* tower bells require dampers in order to produce the desired effect is truly absurd. It is equal to any of the "moonshine" on bells in general with which we have been favoured during the last fourteen years. THOMAS WALESBY.

MATHEW DE RENZIE, KNIGHT: A QUERY.

As a pendant to the sketch of Richard Castles, architect, which appeared in the *Builder* a few weeks ago, the following waif of another forgotten German worthy may be of some little interest. The annexed epitaph is copied from a monument in the churchyard of Athlone, Ireland:—

"This monument was erected for the Right Worshipful Mathew de Renzie, knight, who departed this life 29th August, 1634, being of the age of 57 years. Born at Cullen, in Germany, and descended from the family and renowned warrior George Castriot, *alias* Scanderberg, who in the Christian wars fought 52 battles with great conquest and honour against the Great Turk. He was a great traveller and general linguist, and kept correspondency with most nations in many weighty affairs, and in 3 years gave great perfection to this nation by composing a grammar, dictionary, and chronicle in the Irish tongue: in accounts most expert, and exceeding all others for his great applause. This work was accomplished by Mathew de Renzie, his son, August 29, 1635."

Do any of our Celtic archæologists or philologists know anything of the above works? Are they still extant? The above epitaph is another proof that the Celt is not a little indebted in past time, as at present, for the preservation of his mother tongue, to the intellects of the German "vaterland." Œ.

THE PATENT LAW QUESTION.

MR. C. W. SIEMENS, in his address as chairman of sections of the British Association at Exeter, thus dealt with the Patent Law question:—

"A patent is, according to modern views, a contract between the commonwealth and an individual who has discovered a method peculiar to himself of accomplishing a result of general utility. The State, being interested to secure the information and to induce the inventor to put his discovery into execution, grants him the exclusive right of practising it, or of authorising others to do so, for a limited number of years, in consideration of his making a full and sufficient description of the same. Unfortunately this simple and equitable theory of the patent system is very imperfectly carried out, and is beset with various objectionable practices which render a patent sometimes an impediment to rather than a furtherance of applied science, and sometimes involve the author of an invention in endless legal contentions and disaster instead of procuring for him the intended reward. These evils are so great and palpable that many persons, including men of undoubted sincerity and sound judgment on most subjects, advocate the entire abolition of the Patent Laws. They argue that the desire to publish the results of our mental labour suffices to ensure to the commonwealth the possession of all new discoveries or inventions, and that justice might be done to meritorious inventors by giving them national rewards. This argument may hold good, as regards a scientific discovery, where the labour bestowed is purely mental, and carries with it the pleasurable excitement peculiar to the exercise and advancement of science on the part of the devotee; but a practical invention has to be regarded as the result of a first conception, elaborated by experiments and their application to existing processes in the face of practical difficulties, of prejudice, and of various discouragements, involving also great expenditure of time and money, which no man can well afford to give away; nor can men of merit be expected to advocate their cause before the national tribunal of rewards, where, at best, only very narrow and imperfect views of the ultimate importance of a new invention would be taken, not to speak of the favouritism to which the doors would be thrown open. Practical men would undoubtedly prefer either to exercise their inventions in secret where that is possible, or to desist from following up their ideas to the point of their practical realisation. If we review the progress of the technical arts of our time we may trace important practical inventions, almost without exception, to the Patent Office. In cases where the inventor of a machine or process happened to belong to a nation without an efficient patent law, we find that he readily transferred the scene of his activity to the country offering him the greatest encouragement, there to swell the ranks of intelligent workers. Whether we look upon the power appliances that fashion shapeless masses of iron and steel into railway wheels or axles, or into the more delicate parts of machinery; whether we look upon the complex machinery in our cotton factories, our print works and paper mills, or into a Birmingham manufactory where steel pens, buttons, pins, buckles, screws, pencil-cases, and other objects of general utility are produced by carefully-elaborated machinery, at an extremely low cost; or whether we look upon our agricultural machinery, by which England is enabled to compete without protection against the Russian or Danubian agriculturist, with cheap labour and cheap land to back him, in nearly all cases we find that the machine has been designed and elaborated in its details by a patentee who did not rest satisfied till he had persuaded the manufacturers to adopt the same, and had removed all their real or imaginary objections to the innovation. We also find that the knowledge of its construction reaches the public directly or indirectly through the Patent Office, thus enlarging the basis for further inventive progress. The greatest illustration of the beneficial working of the patent laws was supplied, in my opinion, by James Watt, when, just 100 years ago, he patented his invention of a hot-working cylinder and separate steam-engine condenser. After years of contest against those adverse circumstances that beset every important innovation, James Watt, with failing health and scanty means, was only upheld in his struggle by the deep conviction of the ultimate triumph of his cause. This conviction gave him confidence to enlist the co-operation of a second capitalist, after the first had failed him, and of asking for an extension of his declining patent. Without this opportune help Watt could not have succeeded in maturing his invention; he would, in all probability, have relapsed into the mere instrument-maker, with broken health and broken heart, and the introduction of the steam-engine would not only have been retarded for a generation or two, but, its final progress would have been based probably upon the coarser conceptions of Papin, Savory, and Newcomen. It is a hopeful circumstance that during the next session of Parliament the whole question of the patent laws is likely to be inquired into by a special committee, who, it is to be hoped, will act decidedly in the general interest, without being influenced by special claims. They will have it in their power to render the Patent Office an educational institution of the highest order."

BRADFORD TOWN-HALL COMPETITION: CAUTION.

SIR,—We think it is necessary on behalf of the profession generally, and of the competitors in particular, to call attention to what we consider not only a flagrant breach of good faith, but also of the instructions issued by the Town Council to be observed by competitors.

These instructions contain a clause providing, as far as possible, that the authors of designs shall not be known, and to that end a "motto" is to be affixed to each drawing, and to the inside *only* of the case in which they are sent: the author's name is only to be written inside a sealed envelope, which will be opened after the award is made.

Well, September the 1st was the last day on which designs would be received, and you may judge of our astonishment, on passing through the streets in the evening, to see quite a procession of men carrying some large drawings, forming part of a design submitted by a firm of architects well known in this town, from their offices to a warehouse in Bridge-street, being, in fact, the same warehouse in which were exhibited the recent designs for the covered market, and which is in no way alluded to in the "instructions." These drawings were carried *openly*, and without cover of any kind, and were received as openly by the officials of the Town Council at this warehouse. The "instructions" say that the designs are to be addressed to the mayor, and the mayor's rooms are in quite another part of the town, with the municipal offices. The result of this proceeding is, of course, that the authors of this design are known to the officials, and to every one who saw them.

The question also arises, how did the authors get their instructions to take their drawings to the warehouse alluded to, which is, we have since learnt, to be used for exhibiting the designs?

We think the competitors would be justified in asking that a design delivered in such a manner should be excluded from the competition, as having broken one of its principal conditions. W.

THE ROMAN WALL: HADRIAN *versus* SEVERUS.

M. LUCAS writes,—

"Permettez-moi, en vous remerciant à nouveau de la bienveillante attention accordée à mes œuvres dans votre estimable *Builder*, de vous rappeler, au sujet de ce petit reproche qui m'est fait dans l'appréciation de l'Empereur-Architecte Adrien, 'without quoting any authority,' que tout mon travail a pour base la Nouvelle Biographie Universelle de Didot citée à la première page, et, pour ce qui concerne la grande muraille d'Angleterre, Spartien, que je cite souvent, dit, § x., 'Britanniam petiit; in qua murum per octoginta millia passuum duxit, qui barbaros Romanosque divideret.'

"Veuillez agréer, Monsieur et très-honoré collègue, mes respectueux remercimente."

Without wishing to seem to imply blame by repeating the observation, we think it right to inform M. Lucas that the writer to whom he referred, Ælius Spartianus, is quoted as an authority by those who set up Severus as its author. The partisans of Hadrian have to explain away the statement of Spartian in his life of Severus,—"*Britanniam quod maximum ejus imperii decus est, muro per transversam insulam ducto, utrimque ad finem oceani munivit; unde etiam Britannici nomen accepit*,"—before they can accept as conclusive the passage in his life of Hadrian to which M. Lucas alludes,—"*Britanniam petiit; in qua multa correxit, murumque per octoginta millia passuum primus duxit, qui barbaros Romanosque divideret.*" And not only is the authority of Spartian reversible in this matter,—capable of being quoted by both sides, but his work is scarcely to be considered testimony at all if the estimate of its value in Smith's "Dictionary of Greek and Roman Biography" is correct. Speaking of MSS. of Spartian's "Historiæ Augustæ Scriptores Sex," the writer of the article Capitolinus says,—"No trustworthy conclusion can be drawn from

the styles of the different portions, for the lives do not exhibit the well-digested result of careful and extensive research, but are in many instances evidently made up of scraps derived from different sources, and possessing different degrees of merit, loosely tacked together, and often jumbled into a rough mass destitute of form and symmetry. Hence we find numerous repetitions of frivolous details, a strange mixture of what is grave and valuable with the most puerile and worthless rubbish, and a multitude of irreconcileable and contradictory statements, freely admitted without remark or explanation."

We should have rejoiced if M. Lucas had happily lighted upon some new testimony that could have been cast into the scale in favour of Hadrian. Those who second the claims of Severus quote successively, after Spartian, Aurelius Victor, Eutropius, Cassiodorus, and Paulus Diaconus. One of the latest, if not the last, antiquary who has taken up the cudgels in favour of Severus, is Mr. Robert Bell, Nook, Irthington, whose work, "The Roman Wall: an Attempt to substantiate the Claims of Severus to the Authorship of the Roman Wall," was answered by Dr. Bruce, the champion of Hadrian, in a paper first read to the Society of Antiquaries, Newcastle-upon-Tyne, 1852, and subsequently published, entitled "Hadrian, the Builder of the Roman Wall."

SQUABBLES IN BANBURY.

A VISITOR to Banbury who had looked in at the last vestry meeting would have seen a new version of "Banbury cross." The vicar and others want to improve the chancel of the parish church, and Mr. Blomfield has submitted designs for it, which include a flight of seven steps up to the communion-table, to which and other points in them a number of the ratepayers object. The following conditions were sent to the architect:—

"That this meeting approves of the plans now submitted for altering the chancel of the parish church subject to the following conditions,—

1. That there is to be no elevation of the communion-table by means of steps.
2. Nor any elevation of the chancel floor as now existing.
3. That the communion-table is to be of wood, and moveable, and without any super-altar; and that communion rails be provided as at present.
4. The screen as shown is to be omitted or removed to the western extremity of the chancel.
5. That no decoration shall be made without consultation with the churchwardens and parishioners.
6. And that the plans and specifications shall be submitted to the churchwardens, and be approved by them before any alterations be commenced.
7. That the parish vestry is not to be appropriated for the choir, or for any other purpose than a parish vestry."

At the meeting in question the architect's reply was read, containing these passages:—

"I may as well say at once that it would be quite impossible for me to proceed with the work in accordance with some of these resolutions. I may particularly specify Nos. 1, 2, and 4. To say nothing of my own reputation as a church architect, which would naturally suffer when the work was done and the blunders apparent, I am sure such a plan would never receive the approval of the bishop, nor should I like to ask it. No. 3, I need scarcely say, so far as the material of the table is concerned, is a matter of course. It would be illegal otherwise. The question of a super-altar is one in which I should always be guided by the wish of my employers.

No. 4, there would be no difficulty about.

Nos. 5, 6, and 7 I have no objection to; but Nos. 1, 2, and 4 so completely upset any possibility of a proper or even decent arrangement of choir and chancel, that if insisted on I must decline to have anything more to do with it."

This led to a considerable display of feeling on both sides, and ultimately the meeting was adjourned for three weeks to allow it to cool and consider.

One ratepayer, wishing to answer those who asked the use of the steps leading to the chancel, said,—"For the same reason that in a theatre the stage is always raised above the people, or they would not be able to see," which led one of the most moderate of the objectors to remark that,—"A gentleman near the vicar had made a singularly happy illustration when he talked about theatres, for where these restorations of churches took place, performances had followed as a necessary consequence. Almost as natural as any sequence in the world in these churches the practices—or rather a bad imitation of them—of the Church of Rome immediately followed. They had no objection to the church being made as beautiful as they pleased, provided its Protestant character was preserved."

A very little yielding on both sides will, we have no doubt, bring about a satisfactory result. Unless brought about by some structural necessity, the great body of the English laity object to see the communion-table exalted to the extent here contemplated.

THE BUILDERS OF STRASBOURG CATHEDRAL.

SIR,—In common fairness to our Christian forefathers, such a passage as that quoted by Mr. Alfred Strong, with reference to Strasbourg Cathedral (p. 711, *ante*), should not be allowed to pass unnoticed. The inference that your correspondent, by his italics, appears to draw, is, that the priests called on the people to steal in order to get money for the building. Now, any one acquainted with the very worst features of Mediæval Christianity will, I feel sure, at once recognise that this is simply preposterous. The carefully concealed "old author" must either carelessly or maliciously have altered the text of the appeal. It will be patent to every one that a very slight modification of the sentence as it stands would convey the meaning that, any one in possession of goods which he knew to be stolen, but which he had no means of now restoring to the rightful owners, would be at liberty to offer them for sacred uses. Such advertisements were, I believe, not uncommon in those days.

J. A. S.

THE POPULATION OF LONDON.

IT is not easy to form a conception of the enormous aggregation of human beings which constitutes the London of the present, without some standard of comparison.

This may be furnished by the consideration that it is sufficient of itself to supply a very large colony with cities, towns, and hamlets, as follows:—

	Population.	Population.
1 Capital city, of.....	25 ,000	250,000
2 Large cities, of	100,000	200,000
10 Smaller ditto, of	50,000	500,000
20 Large towns, of	25,000	500,000
30 Smaller ditto, of	15,000	450,000
40 Ditto, of	10,000	400,000
50 Ditto, of	5,000	250,000
100 Villages, of	1,000	100,000
200 Ditto, of	500	100,000
400 Ditto, of	250	100,000
1,000 Ditto, of	100	100,000
1,000 Hamlets, of	50	50,000
2,853		3,000,000

Two thousand eight hundred and fifty-three cities, towns, and villages, with an average population of over a thousand, with a surplus of several thousands over the three millions for a sprinkling of detached houses.

THE NEW POPLAR WORKHOUSE: THE ALLEGED BREACH OF CONTRACT.

AT the meeting of the Poplar Union Board of Guardians, held on the 3rd inst., Mr. J. Barringer presiding, the Board's clerk announced that in accordance with a resolution passed at the special meeting,* he had written to the builders of the new workhouse, stating that the Board's attention had been called to the fact that the materials being used in the erection were not in accordance with the specification, and requesting an explanation. He had received the following reply:—

Sir,—We are in receipt of yours of the 31st ult., written at the request of your Board, informing us that it had come to their knowledge that "some of the material used in the construction of the new workhouse buildings are not in accordance with the description given in the specification;" and in reply beg to state that the only material objected to by your architect as not being in accordance with the interpretation of the contract and specification, consists of a barge-load of bricks, and the timber and deals that have been removed from the premises. With reference to the bricks, we supplied better stocks, in our opinion, than the specification required, and the barge of bricks referred to was sent to us by the same manufacturer whose bricks are now being used (and were selected by your architect as being the best of the various samples sent in for his approval), and immediately one of our firm saw them upon the ground (before the receipt of the written notice to remove them), he ordered them to be carted away, and a letter sent to the party forwarding them to us, asking them for an immediate explanation why bricks of such a character had been delivered. The reply was to the effect that they were not of his make, but had been sent on from an adjoining maker's field, to keep up the regular supply, in consequence of an accident to his barge, which had sunk just as it was ready for leaving.

Respecting the timber, we admit that the specification describes "best Dantzic." We had your architect's permission to use deals for the joists of the pavilion, and we quite agree with him, and are prepared to maintain, that the deals which were sent for this purpose are infinitely superior to any Dantzic timber which is imported. The timber in the roofs of the workshops and relief-offices was objected to by your architect, and has been removed by us, not because we thought it inferior, but to show our desire to meet the wishes of your architect and the Board.

We must also direct your attention to the fact that in every case we enter into contracts for the supply of the material to be delivered to your works to the satisfaction of your architect, and according to the specification. It cannot, therefore, be of any interest to us to use material of an inferior description.

We must beg that you will inform your Board that we have no desire to depart from the conditions of the specification. At the same time, however, we expect the architect to put a fair and reasonable interpretation upon its clauses.

In conclusion, we cannot help remarking that the course taken by your Committee and the Board in receiving the *ex parte* statements made, especially those of the Clerk of the Works (many of which are now proved to be totally without foundation, and the others capable of explanation), without giving us an opportunity of contradicting them until they had been published, is a course which we very much regret, and one that is unjust and calculated to do us a considerable amount of injury.

HILL, KEDDELL, & WALDRAM.

The Chairman said this letter was a very satisfactory one, and he would now suggest that no further proceedings be taken in the matter.

Mr. Blott said he was very far from satisfied. Messrs. Hill, Keddell, & Waldram did not acknowledge by their letter that they were wrong, except in the matter of the barge-load of bricks; and they said they removed the timber not because of its inferior quality, but because the architect desired it.

The Chairman considered that the builders had answered the imputations in a satisfactory manner, and he did hope that affairs would now go on smoothly again. He would be very sorry to show other than a conciliatory spirit over this question.

After a lengthy discussion, a general agreement was made that the matter should now be allowed to drop, and that the Clerk should merely acknowledge receipt of the builders' communication.

* See p. 711, *ante*.

THE NEW OFFICES FOR THE POPLAR DISTRICT BOARD OF WORKS.—STOPPAGE OF THE WORKS.

AT the meeting of the above Board, held on Tuesday evening last, at the Offices, in East-India-Dock road, Mr. Edward Coleman presiding, a letter was read from Messrs. Baker & Constable, of Blenheim Works, Hornsey-road, the builders of the Board's new offices, intimating that in consequence of certain circumstances it would be impossible for them to go on with the building, therefore the works had been stopped.

It appears that the architects (Messrs. Hills & Fletcher and Messrs. Harston) recently objected to the use of some material, principally timber. The builders felt aggrieved on account of the material being condemned, and did not have it removed. Since then Messrs. Baker & Constable have applied to the architects for a certificate of payment of a portion of the contract sum (7,330*l.*), which they (the architects) were unwilling to grant until the whole of the material condemned as defective had been removed. Thereupon the builders refused to proceed with the works, and for the past few days nothing has been done.

In the event of Messrs. Baker & Constable being unable to establish their grounds of refusing to proceed with the works, it will be a matter to them of 5*l.* per day, after a certain date of November, as the contract contains a clause to that effect.

AGRICULTURAL PROGRESS.

Harvest Carting by Steam.—A new use has been made of steam power on the farms of Messrs. Howard, at Bedford. A steam ploughing-engine, which is also used for traction purposes, is now employed in drawing wagon-trains of corn. Many farmers who use steam power for cultivating the land, have thought that if the dormant power in the engine could be used during harvest to facilitate operations in fine weather, they would be able to reduce their stud of horses all the year round, and thus save their keep, amounting from 20*l.* to 25*l.* a horse per annum, besides their first cost. It has now been proved satisfactorily that not only the breaking up of the land, but the seeding or drilling can be done most expeditiously and economically by steam. In utilizing its power at harvest, a missing link has, so to speak, been found, so that on a large farm the few horses kept can be used as an auxiliary to steam, instead of employing a greater number with steam as an auxiliary, as is now the general practice.

Harvesting Crops independently of Weather.—In a letter to the *Times*, Mr. R. Neilson, a tenant of the Earl of Derby, says on this subject:—

"My experience will be found to have anticipated to some extent the recent trials on this subject on a farm of under 300 acres, which I have held for some years as a tenant of the Earl of Derby. During the wet autumn of 1863 my friend and brother magistrate for this county, Mr. Gossage, of the well-known chemical and soap manufactory at Widnes, in this neighbourhood, paid me a visit to explain and impress upon me some ideas he had long entertained as to harvesting crops so as to be independent of weather. Mr. Gossage's notions were, that if corn (however wet it might be) were placed in ricks in such manner that a current of dry or heated air could be forced through it, the superfluous moisture would be speedily driven off and the corn become thoroughly cured. He proposed to do this by means of a centrifugal fan driven by horse or steam power; and if the latter were employed, to use the gases which were produced by combustion of fuel under the boiler to yield heated air to be applied to accelerate the drying."

Mr. Neilson then details his experiments based on Mr. Gossage's idea, and adds:—

"I commenced these operations by the advice of my friend Mr. Gossage, in 1863, and have continually pursued them since that period. I consider that I have now so thoroughly proved the practicability and advantage of these operations, that I can recommend their universal

adoption by my brother agriculturists, in the full conviction that, by these means, we can render ourselves, to a great extent, independent of weather in harvesting our crops."

Danger in Stackyards.—A suggestion has been made, in a letter to the newspapers, by Messrs. Charles & H. White, that corn should always be stacked in the fields in which it is grown. When ricks are placed, as they generally now are, close to each other in a rick-yard, whenever a fire occurs, either through accident or malice, great destruction of property is the result. By stacking the corn in the fields where it is grown a great saving would be effected. With reference to the firing of stacks by the overheating of hay, Messrs. Merryweather & Sons, of the London Fire Engine Works, recommend the use of a "Patent Rick Ventilator," manufactured by Messrs. R. Garratt & Sons, of Suffolk. The ventilator consists of a perforated tube, which is passed into the centre of the stack. A perpendicular funnel is attached to the outlet, and by this means a current of air is caused from the centre of the rick to the open air, all superfluous heat being thereby removed.

Pannification.—A method has been discovered of making bread without grinding the corn, and a patent has been taken out for the process. It is said that whereas in the process of making bread from flour there is much waste, so that 100 pounds of grain yield only 112 pounds of bread, according to the new process 100 pounds of grain will produce 145 or 150 pounds of bread. The new bread is not only increased in quantity, but is also said to be of better quality. According to the old process much of the gluten was decomposed and lost in the heat of grinding. It is preserved when grinding is unnecessary; and the new mode of fermentation contributes greatly to the whiteness of the bread. The new method of bread-making is called "pannification."

Progress in Australia.—At the meeting of the Agricultural Society of New South Wales, in May last, the first prize, class 205, for a portable steam-engine suitable to agricultural requirements, was awarded to P. N. Russell & Co., Sydney, for a 12-horse power portable steam-engine of Clayton & Shuttleworth, with enlarged fire-box for burning wood, and otherwise adapted for agricultural purposes.

OUTBREAK OF FEVER AT SCOTHERNE VILLAGE, LINCOLN.

AT a recent meeting of the Lincoln Board of Guardians, the sanitary state of Scotherne was alluded to, and a terrible state of things was revealed. The subject was introduced by Mr. Mantle, who said that he had requested Mr. Martin to accompany him to the village, and they, with Mr. Grimes and the Rev. E. M. Barry, made an inspection of the place. What they saw he should never forget. The village was full of fever cases, and no wonder. The beck was dried up, and the wells were filled with sewage matter. They went to one pump and found the water emitted an unbearable stench. He (Mr. Mantle) asked a woman if she drank the water from the well, and she replied that she did, but that it stank a bit; and there could be no doubt about that, for the well was full of "pure" sewage matter. They went to another house, occupied by a widow with five children, the head of the family having died of fever last year. This family were now on the books of the union. The house was built on a declivity; the pigsty, privy vault, and cesspool were quite full; and, after a shower of rain, the contents were washed up to and past the door. The family were in an emaciated state, and one of the children was suffering from fever. After inspecting that part of the village, they proceeded to the house of a man named Harrison, who, with his wife, were laid up with fever, and who were both buried in one grave on Sunday last, leaving five children to be supported by the union. On the Wednesday the unfortunate couple were in the last stage of fever, and the villagers had such a dread of the disease, that none of them would enter the house, and the clergyman and the relieving officer had to administer the medicine themselves. Harrison was the best workman in the parish. The cost to the union had already been 12*l.*, and at the lowest computation a cost of 600*l.* would fall upon the union in maintaining the children, and probably they might remain paupers for life. This amount would have been sufficient to thoroughly drain the parish. Mr. Marshall's foreman had since been stricken down with fever, and there were many other cases in the village. Mr. Mantle concluded by moving that the guardians put in full force the power vested in them by the Nuisances Removal Act, and that a committee be appointed to take action in all sanitary matters outside the city. They ought to thoroughly cleanse and drain every village in which fever existed. Fever had existed at Scotherne for two years, and he had noticed that his horse would never drink water at the place unless the beck was running. Mr. Mantle then read a special report, drawn up by Dr. G. M. Lowe, of Lincoln; and after some discussion, several guardians were appointed as a local authority to visit Scotherne and Ingham, and do what was necessary.

CHURCH RESTORATION IN ESSEX.

WE have of late noted the progress of a good many restorations in the eastern counties, and particularly in Essex. It is proposed to make a complete internal restoration of Hornchurch old church. For the work proposed the sum of 2,000*l.* is required, and subscriptions are being now received. The restoration of High Easter Church has cost 2,300*l.* At Margaretting a contract for 630*l.* has been entered into, that sum having been already raised, but to complete the restoration 200*l.* more are yet needed. The ancient church of the parish of White Colne is about to undergo a thorough renovation, external and internal, towards the expenses of which 400*l.* have been subscribed. Fryerning Church is in a dilapidated state, and has been out of use. In addition to what has been contributed towards the restoration of the fabric to its original character, some 200*l.* are still solicited. At Broomfield the church was re-opened a few weeks ago, after having undergone extensive alterations and improvements. With the exception of the ancient tower and part of the south wall, the whole fabric has been rebuilt. A sum of between 300*l.* and 400*l.* is yet required to make the interior correspond with the exterior. All Saints', Springfield, has recently undergone extensive repair, and been supplied with a new organ. In addition to these the parish church of Barling has been restored and the churchyard increased in size at a cost of about 700*l.*; while in June last a new north aisle was added to Southend Church, but the demand for summer accommodation is so great that the erection of a free south aisle is now in hand, to be completed by November. The restoration of St. Mary's Church, Chelmsford, has been in hand some time. Gifts have lately been made in the shape of a fount and memorial window. After works extending over nine or ten months have been done, the church of All Saints, Sutton, has been re-opened and re-dedicated. It is contemplated to make extensive alterations and improvements in church accommodation at Prittlewell, and also at Walton-on-the-Naze, which is very rapidly rising into repute as a sea-side resort. It is desired to erect another church at Walthamstow to meet the spiritual wants of the large and increasing population there. At Writtle the work of re-seating the church and making other improvements has been prosecuted; and at Bishop Stortford and other places on the borders of the county similar efforts have been and are still being put forth.

THE NEW READING GRAMMAR SCHOOL.

SUBSCRIPTIONS are being solicited for the erection of the projected new grammar-school for Reading. The site of the school is on the Redlands estate, and the land will cost 4,000*l.* It contains ten acres. Mr. Alfred Waterhouse, of London, is the architect, and the entire block of buildings, as designed, consists of two masters' houses, one at either end; a large common hall or schoolroom in the centre; and between it and them the various apartments for school purposes and for the use of the boys. The central common hall will be on the first-floor, and approached by a circular turret staircase: its dimensions are 82 ft. by 26 ft. Below it are lavatories, hat and coat rooms, &c., and a covered cloister, leading on either hand to the rooms, for school purposes. The accommodation on either side of the central common hall is a repetition of that on the other. It will suffice, therefore, to describe one of these wings. The master's house on the ground-floor contains a drawing-room, 18 ft. by 15 ft.; dining-room, 19 ft. by 15 ft.; study, butler's pantry and serving-room (these communicate with the boys' common dining-hall), kitchen, scullery, &c. On the first-floor are four bedrooms, two dressing-rooms, bath-rooms, &c., and on the second-floor two bedrooms. The boys' room in each wing consists of,—on the ground-floor, the dining-hall, 30 ft. by 23 ft.; study, 22 ft. by 17 ft.; four separate class-rooms, all connected together by a corridor. On the first-floor, approached by a staircase between the study and class-rooms, are the dormitories, thirty in number, each about 9 ft. by 7 ft., opening out of a corridor, which communicates directly with the first floor of the master's house. On this floor also are the bath-room and linen store-rooms. Above the dormitories is a story devoted to hospital purposes, containing two sick-rooms, a day-room, a nurse's kitchen, which obviates the need of communicating with the floors below. It is proposed to place the building which would have a total frontage of 400 ft., at the upper end of the site, so as to have as much space in front for play-ground, cricket-ground, &c., as possible, and leave room for future master's residence in the lower portion of the ground. The building has been planned in a straight line, rather than in a quadrangular form, in order to receive the maximum amount of sun and air. Each boy will have his own bed-room, and each room its own window. It is proposed that the building should be erected of red brick and with tiles. The entire cost, as stated by Mr. H. J. Simonds, will be 25,000*l.*, and the subscriptions may be paid by three yearly instalments. Subscriptions are received at the three Reading banks.

VENTILATION OF DWELLING HOUSES.

SIR,—Not knowing your correspondent who has brought this principle (*see* p. 704) under your notice, and not very clearly as you state, allow me to say, for your information, that the plan of constructing one shaft instead of one from each room has been in use for over five years, and answers very well; and that the further improvement of introducing the ventilation to each room in connexion with the single smoke-flue, as stated by your correspondent, has been in use over two years, and gives general satisfaction to the tenants and owner of the property. He kindly consents to show any friend I may introduce to see the houses. W. H. KELSY.

HIGH RENTS AND LOW AGENTS.

MAY the owner of numerous houses and shops in the suburbs address a few lines to you (leaving others to renew the subject) on his sad, unprofitable experience of false rents and advertising house-agents? Disliking trouble, I at one period largely employed this class of men. They induced and persuaded me to increase the rents fully 30 per cent., studying, as I foolishly thought, my interest,—a woeful mistake. My houses were always changing tenants; some were one and two quarters empty; from others the inmates "shot the moon." Every new tenant wanted expensive repairs, causing me nothing but diminished income and dilapidations.

Let me explain why agents create this mischief. The higher the rent the greater their charges; the oftener empty the better, as they obtain 1*l.* 1*s.* for the agreement, their commission, and a profit from the builder who is employed. Now I am wiser and more just. Letting myself, at rents which tenants can afford to pay, I secure a regular income, and freedom from the above annoyances.

WM. PERCY TRUEMAN.

SOCIAL SCIENCE CONGRESS, BRISTOL.

THE arrangements for the forthcoming annual congress of the Social Science Association, to be held in Bristol, from the 29th inst. to the 6th of October, are progressing satisfactorily. Sir Stafford Northcote, bart., M.P., will preside over the whole association, and deliver his inaugural address on the first evening of the meeting. Mr. G. W. Hastings takes the presidency of the Jurisprudence Department, in which arrangements are being made for a thorough discussion of the questions of the relations between England and her colonies, charitable endowments, and the occupation and ownership of land. The Rev. Charles Kingsley, lately appointed a canon of Chester, takes that of the Education Department, where the subject of education, whether of the upper, middle, or lower classes of society, will be discussed. J. A. Symonds, M.D., of Bristol, will take the Health Department, where the special ques-

tions for discussion are,—1. Can Government beneficially further interfere to limit the spread of infectious diseases? 2. What legislative measures might be proposed to deal with cases of uncontrollable drunkenness? 3. Should the Contagious Diseases Act be extended to the civil population? The Economy Department will be presided over by Mr. Stephen Cave, M.P., and will specially discuss,—1. Is it desirable that state aid should be given to emigration, and, if so, in what form? 2. In what respects may the administration of the poor law be improved? 3. How may the condition of the agricultural labourer be improved? The congress will be opened by a sermon to be preached by the Lord Bishop of Gloucester and Bristol. During the sitting there will be a conference of ladies interested in educational, sanitary, and other social subjects, under the able superintendence of Miss Mary Carpenter. A working men's meeting is being organised, and *soirées* are to take place. There will be excursions to Cheddar, Tintern Abbey, and the training-ship at the mouth of the river.

THE SOUTH SHIELDS' TOWNHALL COMPETITION.

IN our report on the designs sent in for the above, we expressed an opinion that the one under the motto of "I Work to Win" was the one most likely to take the first premium. Since those remarks were written, the town council have made their final selection, which, after considerable discussion, resulted in the first premium of 50*l.* being adjudged to "I Work to Win," and the second of 25*l.* to the design "Well considered."

The following are the authors of the six sets of plans originally selected by the committee for the consideration and final jurisdiction of the council:—"I Work to Win," Mr. John Johnstone, Newcastle-on-Tyne; "Well considered," Mr. John Johnson, 35, Moorgate-street, London; "Phœnix," Messrs. Potts & Son, Sunderland; "Always Ready," Mr. J. T. Meredith, Kidderminster; "Northumbrian," Mr. J. W. Bailey, Leeds; and "Nota Bene," Mr. C. J. Adams, Stockton-on-Tees.

NEW BUILDINGS IN BELGIUM.

THE new church of St. Antoine, at Louvain, is rapidly approaching completion. It is a large and striking edifice, and consists of a nave of six bays, western tower, aisles, north and south transepts, and a deep apsidal choir. The total length is about 220 ft.; the width of nave and aisles internally about 70 ft.; height to the vaulting about the same, and the width of transepts about 110 ft. The church is built of brick, with simple stone dressings. The west front, however, is entirely of stone, and is the least satisfactory portion of the whole design. The tower is at present only carried up to a few feet above the ridge of the nave roof. The interior is vaulted throughout, the vaulting columns and arches being executed in rough moulded brick, which is to be covered with a very thin coating of plaster; the capitals, bases, triforium, arcade, and more ornamental portions of the work being carved in stone. Although there is plenty of ancient authority for this kind of construction, yet it seems to us hardly satisfactory; and one would think that first working the arches in moulded brick, and then again in plaster, would be little less costly than stone. All the details of the church are excellent, except portions of the west front, which seem to us to be later in character and less satisfactory than the rest of the church. Mr. Lavalle is the architect.

A new church has been opened some months ago at Ostend: it consists of a nave and aisles, all vaulted, a deep chancel, and a western tower and spire over a porch. The spire is of slate, and has four tall slated pinnacles at the angles: it is the best portion of the design. The porch below the tower is very shabby, and looks internally more like a scullery than the entrance to a church. The high altar is well carved in oak, and there are a set of rich canopied stalls in the chancel. There is a great deal of stained glass of doubtful merit.

The new church at Laeken, near Brussels, has been opened, though far from finished. Although this is one of the largest and most costly Gothic churches of modern times, the general effect is not satisfactory. The three towers crowded together at the west end want boldness; the whole front is cut up with perpendicular lines, and the huge extinguisher roof crowning the lady chapel at the east end, surmounted with an immense acorn, bears no resemblance to any kind of Gothic architecture that we have ever seen. We are sorry to have to speak in this way of a building erected with such noble intentions, but our duty as critics compels us to call attention to these defects in a building of such magnitude and pretension as the new church at Laeken.

CHURCH, BRIDLINGTON QUAY.

SIR,—Not having seen your last week's number, I am not aware that you mentioned the result of the select competition for the new church at Bridlington Quay, proposed to be erected on the Beaconsfield estate.* I now beg to send you an abstract of the protest three of the competitors have forwarded to the committee.

On the grounds of unfairness in choosing a design that was not the best or in accordance with the instructions, but said to have been carried by the votes of relatives of its author, who were on the committee.

That a sixth competitor was admitted, and his design put to the vote; by which they broke their agreement with the five they invited, in accordance with the resolution passed at one of their meetings, in which the five architects were named; and as the placing of this nameless individual's design, "Con Amore," in competition, was quite irregular, and contrary to their own resolutions, as well as damaging to the chance of the others, they required the matter to be re-opened, and professional assistance called in to decide on the merits of the designs,—or that they should be fully remunerated for their time and trouble in preparing plans, &c., as instructed.

J. B. & W. ATKINSON.
ALFRED CROUCH.

RAILWAY MATTERS.

New Works at Liverpool.—The extensive new works on the London and North-Western Railway in this locality, and which include the construction of an additional double line of railway from Edge-hill to Huyton, Prescot, and St. Helen's, in order to afford increased accommodation to the over-crowded local traffic, are proceeding with rapidity; and the new railway, as it may be called, between Liverpool, Huyton, Prescot, and St. Helen's, is expected to be ready for opening in the course of a few months. The new double line commences near the company's large engine depôt at Wavertree, from which point the existing line is in course of being widened to double its present extent, the excavation through Olive Mount being exceedingly heavy. Nearly the whole of the excavation on the south side through the Mount has been completed, 140,000 cubic yards of stone having already been taken out; and we may state that 14,000 cubic yards of this stone have been removed in large blocks or squares and conveyed to Garston, where it will be used for the walls of the new docks which the company are immediately about to construct there. All the bridges across the railway from Wavertree, through Olive Mount, have also been taken down and widened to nearly double their former extent, and an additional new bridge has also been constructed. Amongst the more important works which the company have in progress between Liverpool and Huyton is the reconstruction of the several stations at Broad Green, Roby, and Huyton, in order to extinguish the objectionable and dangerous level crossings at each of those stations. Extensions of great magnitude have recently taken place at the Edge-hill station, which now occupies an area of 95 acres.

The first half of the vast roof at the Lime-street station has just been completed. Messrs. Thompson, the contractors, have entered upon the contract for the other or western half, whilst the company's monster hotel facing Lime-street is being covered in.

The Threepenny Fares.—Mr. Brandon has brought his scheme for the wholesale reduction of fares before the British Association, in a paper titled "Some Statistics of Railways in their relation to the Public." Mr. Brandon showed that the returns made for railway investments had not been such as might have been expected from capital laid out, and that the public had every reason to complain of the present railway system. He suggested that it could only be accomplished by uniting all the railways under one general management, to form them into a separate branch of the public service. Mr. Brandon contended that a passenger should be enabled to travel one journey, of any distance, in a given direction, for a sum little more than nominal. In 1868, 310,150,915 passengers travelled on the railways, paying an average fare of 11¼d. to 11½d. Six times the number of passengers could be carried for a very small (if any) additional expense; and if a universal fare of 3d. was charged for any distance for each person, at a very moderate computation, six times the present number would travel, and would produce 23,261,318*l.*, being 8,536,516*l.* in excess of the receipts of 1865 from passengers only. But he would fix the fares for any distance at the following rates: first-class, 1s.; second, 6d.; third, 3d.; and for such first-class passengers as would pay 10*l.* and 5*l.* annually in addition for such distinction, should travel in carriages provided exclusively for them. In conclusion, he showed that the scheme would have a beneficial effect on the labour markets, by enabling a workingman to remove at once to the district where his skill is in demand, and would thus tend to equalize the value of labour in the country.

* See p. 711, *ante*.—ED.

ACCIDENTS.

BY the fall of a builder's scaffolding at the gasworks, City-road, Manchester, some seven or eight men have been severely injured. The city corporation are constructing at these works a large circular pit, which is about 200 ft. in circumference. The boundary-wall of the pit, which is of brick, is in course of erection, and has already been raised to a height of about 26 ft. The circular scaffold for the workmen which surrounds this wall appears to be of a somewhat slender structure, supported by a horizontal beam embedded in the brickwork and an upright plank, which apparently had no means of support apart from its own equilibrium. About 20 ft. gave way, and eight or ten men who were working on the scaffold were precipitated a depth of 26 ft. The scaffold was repaired soon after the accident, and work resumed. The fall had not been caused by any breakage, but simply from the slipping of the upright plank, which had lost its balance.

A new chimney is now in course of erection at Shrewsbury, on Mr. Cock's premises, at the bottom of Barker-street. The shaft, which, when completed, will be 120 ft. high, has been raised nearly 80 ft., and lately a man had been working at the top, and was descending, with his feet upon some weights, which were attached by a chain and hook to the rope, when the hook broke, and he fell a distance of about 50 ft. The chimney is so narrow internally, that the man did not turn over, and he fell, consequently, upon his feet with fearful force. He now lies in a sad state, his spine, it is feared, being injured, as well as the lower part of his body. At the end of the rope, which is a strong one, a chain is attached with some weights, and when a workman wishes to ascend or descend this chain should be removed, and a stronger one, which is provided for the purpose, put in its place. The workman, however, neglected to do this, and attempted to descend by placing his feet upon the weights and holding on by the rope, when the hook broke.

FROM SCOTLAND.

Edinburgh.—George Watson's Hospital has been sold to the Royal Infirmary for 43,000*l.*, on condition that the necessary consent of the subscribers to the building fund of the Infirmary by obtained, and also an Act of Parliament got for granting sufficient powers to accept the offer. This resolution of the Governors of the Hospital is subject to the special approval of the Merchant Company.——The extensive area of ground belonging to Mr. William Cunningham Glen, of London, barrister, and his sisters, adjoining Lauriston Park-street, has been feued to Messrs. Shore & Crawford, builders, who have commenced operations for the construction of two streets, running north and south, in which will be erected houses of a respectable class, similar to those in Lauriston Park—the north frontage of the ground opposite Portland-place being to be occupied with handsome shops having flats of dwelling-houses above. The plans of the new buildings have been prepared by Mr. R. T.

Shiells, architect, and revised by Mr. D. M'Gibbon.——The nursery ground on the east side of Leith Walk, which has recently been recovered from Messrs. Dicksons & Co. by the Governors of George Heriot's Hospital, was exposed for public sale in the Council Chambers, Mr. Murray being the auctioneer. The front space was divided into four feus. The first of these, that to the south, measuring 55 ft. in breadth, was put up at 12s. per foot, and after a little competition was knocked down at 14s. Lots 2 and 3, measuring each between 60 and 70 ft., were sold at 12s. per foot. Lot No. 4, also measuring between 60 ft. and 70 ft., was put up at 12s. per foot, and sold at 15s. Lots 1, 2, and 3 of the back feus, measuring, one of them a third, and the other two each half an acre, were sold at the value of 100*l.* per acre, with 2*l.* additional on the actual price of the smaller lot. The whole of the lots were knocked down to one purchaser, Mr. Wilson, contractor, Granton. Other seven lots to the east, which had also been marked off for sale, were not disposed of.

Glasgow.—A meeting of members of the City Improvement Trust, with factors and others having charge of property recently acquired by the trustees, was lately held in the Council-hall, with a view to adopting measures to mitigate the evils of overcrowding and uncleanliness in the densely populated parts of the city. In the course of the proceedings reference was made to the unusual increase in the number of fever cases at this season of the year; and the opinion was generally expressed that as the Improvement Trustees were now proprietors of property in the lowest portions of the city in which nearly 12,000 families found accommodation, they were in a position to grapple with the matter with a firm and vigorous hand—to prevent overcrowding, and almost to enforce cleanliness. It was resolved that a notice should be issued to the tenants, and inserted in a prominent place in their rent-books, containing various special intimations as to expulsion for overcrowding, uncleanliness, &c.

Greenock.—A meeting of the Greenock Water Trust was recently held to consider the state of the water supply. The Provost stated that there were 5 ft. of water in Loch Thom, and 16 ft. in the compensation dam—equal to 13,000,000 cubic feet, or 81,000,000 gallons. The supply to the mills, refineries, and public works along the line of falls, had been stopped; and the present water in store, with the compensation water saved from Cartsburn and the shortened interval of domestic supply, was estimated to be equal to thirty-one days' domestic supply as at present. Of the works along the line of falls, two only had been granted a supply for machinery.

Alyth.—A meeting of the promoters of new water-works has been held. The principal object of the meeting was to hear the report of the surveyor, Mr. James Lamond, as to the probable cost of the entire undertaking. His estimate for forming a reservoir at Fyal—the place from which it is proposed to take the water—laying a 4-inch metal pipe from there to the north side of the town, a distance of about 3,000 yards, forming a small reservoir there, and distributing pipes through all the streets of the towns where there are no pipes laid, besides erecting twenty additional fountains, would amount to 1,061*l.*; but with glazed clay pipes of the same diameter the whole distance, there would be a saving of 300*l.* The meeting was unanimous as to the desirability of immediate action by framing and signing a requisition to the Parochial Board as the local authority. It was shown that the rateable rental of the town was 3,000*l.*, and that 6½d. per 1*l.* would pay stock and interest of 1,100*l.* in twenty-five years: so that ample provision remains to meet all outlay.

CHURCH-BUILDING NEWS.

Chellington.—The church of Chellington has been re-opened for public worship. It had only been partially repaired for many years past, and had fallen into such a dilapidated state that it was pronounced no longer safe to use it. It required a new roof, floor, and seats throughout the whole building. The arch at the west end of the nave, and several windows and arches blocked up and disfigured, were to be restored. A bell, cracked how long no one knew, was to be recast, and other works required attention; and these works have been begun and in a great measure brought to completion.

Titley (*Herefordshire*).—The re-opening of this church took place on the 3rd instant. The new church, which replaces one erected a century ago, consists of nave, north aisle, with arcade of four bays, south porch, chancel, organ chamber, and vestry; the old tower is retained. The walls are built of Penrhos stone, Bath stone being used for the dressings. The arcade shafts are blue Pennant. The fittings throughout are of oak, and the accommodation provided is for about 220 persons. The church is warmed by underground stoves. The windows, with the exception of the two on the south side of the chancel, which are filled with stained glass by Messrs. Baillie, are glazed with cathedral tinted glass by Messrs. Done & Davies, of Shrewsbury. The encaustic tile floors are from Godwin, of Lugwardine. The style of the church is Early Decorated; and the work has been carried out by Messrs. Lewis & Day, of Hereford, under the direction of the architect, Mr. E. Haycock, jun., of Shrewsbury.

Wettenhall.—The chapel-of-ease here is to be rebuilt on an enlarged scale, and, as a parish church, dedicated to St. David. It is also proposed soon to commence the erection of schools, and eventually a rectory-house. The edifice will be built on the site of the old chapel-of-ease, on the road from Over to Bunbury, and about nine miles to the north-west of Crewe. As the funds are limited (the cost, allowing for the old materials, will be about 700*l.*), it was determined to construct the edifice of brick and other inexpensive materials. The style is a simple type of thirteenth-century architecture. In shape the church will be cruciform, the total dimensions from east to west being 67 ft. 5 in., and in the body of the church 26 ft. 9 in. wide, and from north to south walls of transepts 36 ft. 5 in. by 14 ft. 4 in. wide. The entrance is by a south porch. The minister's vestry is in the arm of the south transept. At the side of the nave coupled windows alternate with buttresses. Triple windows are placed in the gable walls of the chancel transepts and west end. The west end gable is surmounted by a bell-turret, and other gables by ornamental stone and iron crosses. White Kelsall stone is to be sparingly used; the roof is to be of open timber-work varnished. All the sittings—180—will be free and unappropriated, and will be made of Savannah pitch pine, which has been supplied to the builder at a nominal price by a tradesman of Winsford. The architect is Mr. James Redford, of Manchester, and the contractor Mr. P. Hodgkinson, of Sandbach. A *fête* has been held at Calveley Hall, Earl Grosvenor's seat, in aid of the funds.

Long Eaton.—The parish church of Long Eaton has been re-opened, after having undergone considerable enlargement and improvement. For many years past the old church was felt to be inconvenient; and as the population of the parish increased it became totally unsuited to its requirements. It would only seat 252, and those in pews of the most unseemly description. Accordingly, about four years ago, the vicar, the Rev. Mr. Atkinson, determined upon making an effort to enlarge and restore the edifice, and a subscription was started. Many of the parishioners coming forward to assist, instructions were given to Mr. Street to prepare plans for the enlargement of the church. Mr. Street soon submitted his designs, which met with general approval, and the work of restoration was commenced; Mr. Hunt, of Long Eaton, being the contractor. The old church has been made to form the south aisle, and to this has been added a north aisle, a nave, and a chancel, the architecture of which corresponds to that of the old building. All of it is built of stone. The old pews have, of course, been swept away, and plain open seats erected in their stead. A new pulpit of carved stone, by Mr. Earp, of London, has been procured, and two stained windows have been placed in the chancel. One of these represents Christ in the manger, and also in the Temple; and it has been given by the teachers and children of the Sunday school. The other represents Christ's baptism by St. John, and His disputation with the doctors in the Temple; it has been contributed by the children and teachers attending the night school. They are the work of Messrs. Ward & Hughes, of London. The vicar has been at the expense of another painted window, manufactured by Messrs. Hardman, of Birmingham, which is placed in the south aisle. The cost of the whole improvements will be about 3,000*l.*; and towards this sum 2,200*l.* have been raised. The church will now accommodate about 600.

Longdon.—The foundation-stone of a proposed new and enlarged chancel to Longdon Church has been laid. Mr. Griffiths is the builder, by whom the work of renovation has been undertaken. The funds at the disposal of the vicar being inadequate, it is proposed to do no more at present than to render the body of the church more suitable for the performance of Divine service by rebuilding the chancel, with the addition of an organ recess and vestry, opening and affording space for additional sittings in the old tower. The tower is the only remains of the old church, which, being somewhat dilapidated, was pulled down, and the present edifice was erected. It is proposed to substitute open sittings, to remove the pulpit to a proper position, to remove an obnoxious gallery, and erect a church portal on the southern side. It is hoped that ere long funds may be forthcoming for casing the present brick and stucco structure of the body of the church with the grey sandstone obtainable on the spot. It is also proposed to convert the Grecian windows into a more Ecclesiastical style.

Barnard Castle.—The foundation stone of a Free Christian Church has been laid in Newgate, Barnard Castle. For more than a quarter of a century a Free Christian Church has existed in Barnard Castle. The members have assembled in a building in the Broadgates, but the situation being somewhat obscure and out of the way, it had long been felt to be desirable that a commodious place of worship should be built by the community in a more central and public situation, and the site for the building was purchased in Newgate. The church will be Gothic in style, and will be built from designs by Mr. Harrison, of Manchester. It will contain 150 open sittings, but no gallery. A school will also be attached to the church, and by the removal of two screens 100 more sittings in this school can be added to the church at any time. The estimated cost of the building is 1,000*l.*, of which 900*l.* have been subscribed. Mr. Donaldson has contracted to do the stonework, Mr. Carter the joinering, and Mr. J. Jackson the plumbing work.

Books Received.

"ON certain Economical Improvements in obtaining Motive Power." By Richard Eaton. This is a reprint of a paper read by Mr. Eaton before the Mechanical Science section of the British Association at Exeter. It relates to an invention of a Mr. Warsop, of Nottingham, which is held to be of great importance. Patents for "obtaining motive power" are not seldom schemes of perpetual motion; but with such schemes this has nothing to do. It relates to what is called "Warsop's Aëro-Steam-Engine," in which compressed air is introduced by means of the air-pump into steam-boilers, for the purpose of aiding in the production of power and the economization of fuel. Professor Tyndall is said to have volunteered to investigate the scientific bearings of the results, as personally observed in Nottingham, by Lord Richard Grosvenor, who is an amateur engineer, and by others.——"Twickenham Drainage: Report on a Proposed System for the Drainage and Disposal of the Sewage." By Henry M. Ramsay, Surveyor to the Twickenham Local Board.——"Twickenham Local Board: Report on the Drainage and Disposal of the Sewage." By the Local Drainage Committee.—These reports recommend that the plan for the drainage of the parish should comprise the town and all outlying districts, as shown in the surveyor's plan. The committee recommend the board to adopt irrigation as the system for dealing with the sewage; and advise 100 acres to be purchased, although they consider that 60 acres, as stated in the surveyor's report, would suffice, according to a report from Banbury, which has 120 acres for a population of 11,000. The committee are of opinion that the parish drainage will thus become not only self-supporting, but a source of pecuniary profit. ——"Natural Philosophy." By John Tyndall. London: Cassell, Petter, & Galpin.—We need not say anything in recommendation of Professor Tyndall on Natural Philosophy, which in this case is intended for boys.——Other two of Messrs. Cassell's little books for children, which happen to be within reach of us, are "Æsop's Fables," in words of one syllable, by Mary Godolphin; and "Evenings at Home," in words of one syllable, by Uncle John, author of "The Children's Album."—Whatever we may think of the peculiar English which authors are

constrained to write where no two or three-syllabled word is allowable, the ingenuity with which these books are written is surprising; they are fair specimens of good sound Anglo-Saxon, too; all the more, it may be, that they are free from long Latin and other importations.—"The Civil Service Book-keeping: Book-keeping no Mystery: its Principles popularly explained, and the Theory of Double Entry analysed." By an Experienced Book-keeper. Lockwood & Co. This treatise on book-keeping is intended for the use of young men commencing business, examination candidates, and students generally. We have no doubt it has been prepared by "an experienced book-keeper," who appears to have belonged to Her Majesty's Civil Service.

Miscellanea.

Mortuary House, Marylebone. — Dr Whitmore says in his last monthly report:—By an order of the vestry, the mortuary-house, situated in the Paddington-street Burial Ground —and which has been ready for the reception of the dead for the last six months—will be opened for public inspection for the next five or six weeks. It is to be hoped that the poorer classes in particular will take the opportunity of visiting it, in order that they may judge for themselves of its extreme fitness for the purpose for which it has been erected. It is a thing of common occurrence that bodies are kept unburied for eight or ten days, owing to the inability of surviving friends or relatives to find the money to pay for the interment. In such cases it most frequently happens that the bereaved family have but one room in which to live, sleep, and perform every domestic office; here, then, in the midst of them lies the decaying mass of mortality, poisoning the atmosphere they breathe, and endangering their health and even their very lives. Surely, both on the score of personal safety, as well as from a feeling of respect and reverence for the mortal remains of those whom in life they loved, the poor will see the desirability of making use of this fitting mausoleum, as a temporary receptacle for the bodies of their deceased children or relatives, to which they will have daily access, and for the use of which no fee or charge whatever is required.

A Mission of Inquiry.—Mr. Conolly, artizan, has been deputed to go to the United States in order to report upon the condition of labour in that country, and has bidden farewell to the South London Lodge of the Operative Masons' Society. An address was presented to him, and in reply he said he was not undertaking the mission with any view to his personal advantage. His object would be to find out the hours of labour in every branch of trade, as well as the amount of wages. He should further inquire whether workpeople lived in boarding-houses or houses of their own. He should endeavour to ascertain whether, with their dollars in America, people were better off than with their shillings in England. He should make inquiries, too, with regard to education, the system of which in America was said to be one of the best in the world for the youth of the working classes. His object would be to find out whether, under that system, the lads became more skilful artisans, better citizens, or more worthy heads of families. He would particularly inquire into the working of Abraham Lincoln's Act, whereby, it was said, any steady man was enabled to acquire 150 acres of land after residing upon it for five years. He would ascertain in what respect the trade-unions as there existing differed from trade-unions at home. One member of the Government (Mr. W. E. Forster) had sent him 5*l.*, as well as an introduction to Mr. Adams, the late American Minister to this country.

Driving Piles by Gunpowder.—An improved pile-driving machine has been invented by a Mr. Shaw, and is manufactured at Philadelphia by a new company. Hand and steam are superseded in this invention by gunpowder, which, by its explosion, excited by the fall of a hammer on a small quantity of fulminate, in cartridges fed into a cylinder, causes a recoil of the cylinder, which forces the pile into the ground. The cartridges can be thrown in at the rate of 50 per minute, and the hammer is thus kept going without a lever. The charges of powder are said to be only one-third of an ounce each. The hammer is one of 675 lb. weight: it is thrown 8 ft., and exerts a force on the head of the pile equal to a dead weight of 300,000 lb.

New House, Sink, Yard, and Ventilating Trap.—Mr. James Mansergh has lately designed a trap with a special view of keeping sewer gas out of dwelling-houses. The waste from a sink-stone, &c., is discharged into the trap out of sight. The vertical socket for receiving the waste-pipe is burned in with the trap, so as to form with it one piece of stoneware. The upper part of this socket is tapered to take in any size of pipe; the lower part extends an inch or so below the tip of the opening into the gully forming a water-trap. Over the gully is an open grating for the ingress of surface water; the plate forming one side of this gully is carried down below the bottom of outlet to drain, forming a second water-trap entirely independent of the first. Behind this trapping plate, and in free communication with the drain, is a socket, to which may be connected a ventilating pipe of any size up to 4 in. diameter. By this ventilator, which is to be carried up above windows and away from chimneys, the house-drain is relieved of pressure, and the gas has therefore no tendency to struggle through bad joints or traps into the space under lower floor. On the waste-pipe from the sink, there is a junction into which the wastes from baths and lavatories, and especially the overflows from cisterns, are to be taken, thus cutting off these from becoming direct flues for the ventilation of drains into the upper parts of houses.

Covering Walls with Glass for Protection of Fruit Trees.—In a paper read at the Manchester Congress, July 22, 1869, it was said: Where there are walls with a southern aspect in gardens, a covering of glass will be found the cheapest and most certain way of securing crops of the finer fruits, such as peaches, nectarines, and apricots. When the new kitchen garden was planned at Welbeck, a range of south wall nearly 800 ft. long was covered with glass on a novel principle. All the framework is of iron, and the roof made on the ridge-and-furrow mode, and glazed with strong plate glass, cast on purpose to suit the curve in the roof. The openings for top ventilation are made in the back wall, and every alternate light in front is opened and shut by machinery worked from the inside. The height of the back wall inside is 13 ft., in the front 7 ft. 6 in., and the inside width 7 ft. 4 in. This structure is heated by hot-water pipes, and these were found very useful this spring, for good crops of peaches and nectarines have been secured, as well as plenty of cherries, plums, and pears grown in pots. Fire-heat is only used at the time they are blooming, or in the autumn, to ripen the wood, as the object of this structure is to get a succession of peaches and nectarines after the hot-house ones are over.

Magnetic Disturbance of Watches.—An American watchmaker has made the curious chance discovery that the balance-wheel in nearly every watch is, if made of steel, converted into a magnet. By what process in the manufacture it has become one it might be difficult to say; but whether the wheel be indeed a magnet or not may be easily discovered by fixing it upon a small piece of cork, letting it float in still water, and seeing if it always turns in one direction. The fact of the magnetic character of the wheel will account for many irregularities in watches which have hitherto been inexplicable. A key, an iron brace-buckle, or the steel blade of a knife near or in the same pocket as the watch, may exert a disturbing influence. But even if there should be no piece of steel in or near the pocket, the magnet will necessarily tend towards the north, and so far interfere with the calculations of the watchmaker in a very delicate piece of mechanism. Gold-balanced watches must thus be far preferable to steel-balanced ones.

Wrought-iron Chimney at Creusot.—A new wrought-iron chimney has been recently erected at the Creusot Ironworks. The *Engineer* gives particulars of it. It is 197 ft. high and 6 ft. 7 in. in diameter. At the bottom the diameter is increased to 10 ft. by a curved base which is fastened by vertical bolts to masonry work. The thickness of the sheet iron is $\frac{3}{32}$ in. at the top, and $\frac{7}{16}$ in. at the bottom. There is an inside iron ladder. The weight of this chimney is 40 tons; it has been riveted horizontally and lifted afterwards with a crane. Another, 275 ft. high, will soon be erected, but by a different system; it will be riveted vertically, with an inside scaffolding. These chimneys are built for an extension of the Creusot Works, especially intended for steel-making.

Telegraphic Progress.—Mr. Varley, the electrician, is at Brest for the purpose of remedying a fault in the French cable at a point about 1,000 miles from the French coast. Mr. Varley, without raising the cable, hopes to be able by some manipulation of electricity to produce at the precise spot of the fault an effect similar to electrotyping on the surface of the conducting wire, and by this means prevent the escape to earth of any portion of the electric current. Sir William Thomson notifies that a plan for electric testing at sea has recently occurred to him as available with Mr. Varley's form of cable, which will give a security against faults not attainable with any form of cable having metal in its outer covering. According to this plan a fault existing in the coiled part of the cable on board ship, and merely producing an addition to the general leakage scarcely recognisable as due to an incipient fault, will make a sudden and decisive indication after it passes out of the tank, and before it reaches the stern pully. The alarm will thus be given at the right time to stop the egress of the cable, and cut out the fault with a minimum of risk and delay.

The Workshops Act.—Mr. Redgrave, one of the inspectors of factories, in the half-yearly report just issued, says:—"I am very sanguine that this Act will eventually be a success. I found this opinion upon the expressed willingness of employers to accept it as legislation in a wise direction, upon their readiness to observe its provisions, and upon the entire absence of quibbling or misrepresentations to escape the restrictions. Granted that in some respects it might be improved, yet in its main features, in the restriction of the labour of females and young persons, it has already entirely changed the features and aspects of some trades; and in the necessity it imposes upon children to attend school it has already in a great number of trades prevented the improper employment of infants, and is preparing the way for a general observance of school attendance. A very slight pressure of the local authorities would make this Act as well observed and as popular as the Factory Act itself. But the educational effect of the Act is by no means satisfactory. Manufacturers will not employ school children — half-timers — in their establishments.

Opening of the Southern Embankment of the Thames.—The second portion of the Thames Embankment on the south side, namely, that which commences at Lambeth Bridge and terminates at the end of the Potteries, is now so far completed that the public have been permitted to walk along it instead of, as formerly, proceeding through the dirty thoroughfare which runs parallel with it. Nearly the whole of the Embankment is now paved, and as soon as the roadway is finished it is understood that the Metropolitan Board will permit its instant use for traffic. The first portion of this Embankment, it will be remembered, was opened about twelve months since from Westminster Bridge to Lambeth Bridge. The extensive demolition of houses in the Potteries has considerably improved its appearance.

The International Horticultural Exhibition at Hamburg.—This exhibition has been opened. The buildings stand on a site between Hamburg and Altona. The hothouse in which the principal productions are exhibited is adorned with a figure of Fame, a copy of the work of Paul Delaroche in the School of Fine Arts in Paris. The walls are decorated with flags of all nations, surmounting names of naturalists and horticulturists. The exotic plants in the park give something of a tropical character. Competent authorities are engaged in arranging the flowers as they arrive, so as to suit the architectural details of the building.

Descendants of the Nearly Extinct British Barbarians.—Some savages in the parish of St. Hilary, according to the *Cornish Telegraph*, have wilfully destroyed Trewhella Cross. The matter is to be brought before the Penzance Natural History and Antiquarian Society, with a view to their prosecution in a criminal court.

The New Theatre, Croydon.—Several alterations and improvements have been made in this theatre during the recess. The stage has been lengthened 22 ft., and a separate approach added to the stalls. The gallery floor has been sheathed and felted, which will deaden the treading of feet overhead. The theatre has been taken on a lease by Mr. Clarence Holt.

Santiago-de-Chili International Exhibition.—Last year the Chilian Government advertised an agricultural exhibition, in which some large prizes were to be distributed to the successful competitors. A grand prize of a gold medal and 800 dollars, or 160*l.*, was offered for the best collection of agricultural machinery; and another of a gold medal and 500 dollars, or 100*l.*, for the best steam-thrashing machinery. Many other gold medals and prizes of smaller value were offered. English firms have carried off the lion's share of the prizes. Messrs. Ransomes, Sims, & Head, for their thrashing-machine, got the first prize and gold medal; Messrs. Clayton & Shuttleworth the second gold medal. Special prizes were also gained by Messrs. Howard. American manufacturers came in second for the chief prize.

The Smoke Nuisance at Newcastle-upon-Tyne.—The committee appointed at the meeting held in the Guildhall, Newcastle, has had a conference at the council chamber, under the presidency of the Mayor. Considerable discussion arose as to the steps to be taken. The most perfect unanimity, however, prevailed as to the desirability of acting in such a way as not to embarrass unnecessarily the important manufacturing and mining interests of the neighbourhood. There is said to be a general feeling among owners of works, collieries, &c., that the time has come for doing something towards suppressing the nuisance. A sub-committee was appointed to inquire into all the plans proposed or in operation for the prevention of smoke and noxious vapours, and to report to the general committee at their next meeting.

School of Art for Burslem and Tunstall. A meeting has been held in the Lecture Hall of the Wedgwood Institute, Burslem, in furtherance of the opening, at the Institute, early in October, of a school of Art and Science for Burslem and Tunstall, and to appoint a master for the school. A committee of eleven gentlemen in each of the towns named was appointed. Mr. Hope, a manufacturer, said he trusted the committee now appointed would prove to be an active one. He remembered a former school of art at Burslem, which decayed, he feared, partly from lack of activity on the part of the committee. Now they had such a noble building for their purpose they were doubly bound to activity. Burslem and Tunstall ought not to be one whit behind Stoke and Hanley in artistic skill. The members of the new committee present proceeded to make choice of a master, and Mr. Theaker was elected.

The Building Trade in Paris.—The Paris correspondent of the *Telegraph* says:—

"One of the largest branches of Parisian industry, that of house-building, is threatened with a strike on the part of the workmen, who seem to be in a great state of agitation and discontent, especially the masons and stone-cutters. I must tell you that the number of contractors for this department is limited to three or four great firms, the most important of which has just lowered the men's pay considerably. Where they gave 3f. 50c. before the 1st of September, they pay only 2f. 75c. now. In 1865 and 1866, at the height of the building furor, the wage was 4f. 25c. Now that the furor is fast declining, and that most of the anticipated speculations are realised, contractors no longer think it worth their while to pay the workmen at the same rate. But the remaining works of Paris will certainly come to a "stand still," if the discontented corporations carry out their plans, which are not only to strike, but to emigrate, as they find there is now no chance whatever of their gaining nearly as much as they did formerly."

Proposed Alterations of Liverpool Town-hall.—The town council have agreed to a recommendation of the finance committee, to adopt a general plan submitted, showing alterations of the Town-hall for the accommodation of the mayor, and the enlargement of the council-room, at a cost not exceeding 3,000*l.*; but have added to their resolution that the appropriation of the several rooms, and the details of the plans, and also of the fittings and furniture, be postponed for further consideration.

The English Congregational Church, Swansea.—We are asked to say with reference to the notice of this building in our last issue, that the interior is not in one open span as stated, but is divided by iron columns into "nave and aisles." Further, the gas-fittings were *manufactured* by Dovey, of Manchester, though *supplied* by the local gas-fitter, Mr. Holmes.

French Prizes for Architecture.—M. Duc, the architect who lately obtained the Emperor's prize of 100,000f., has paid 40,000f. into the treasury of the French Institute to found an annual prize for the encouragement of architecture.

Leavesden, Woodside.—Mr. Mann, the contractor for building the St. Pancras Parochial Schools, has protested against Messrs. Killingback & Rudley entering on the ground for the purpose of carrying out the drainage works; but the guardians, acting under legal advice, are determined to proceed with the works. Mr. Mann did not send in a tender for the drainage works, but forwarded a schedule of prices, through the architects, which the guardians could not accept, as they had invited tenders for a fixed sum.

Removing Incrustation in Steam Boilers. A mixture called halogium, says *The Penny Mechanic*, is sold and used in Germany for preventing the formation of incrustations in steam-boilers. The mixture consists of 65 per cent. of sal ammoniac, 17 per cent. of chloride of barium, and 18 per cent. of catechu, and is said to answer its purposes very well. Chlorine, which exists in the sal ammoniac, as well as in the chloride of barium, is a halogen, which seems to account for the name halogium.

Proposed New Hospital at Royston.—It has been determined to erect at Royston a small hospital, for the treatment of the poor who cannot properly be attended to at their own homes. It is intended that the hospital shall be partially self-supporting. Lord Dacre has given a site for the hospital and its garden. Mr. E. Nash has undertaken to provide the architectural plans for the building, which will be constructed with a due regard to sanitary arrangements, as recommended by Captain Galton, R.E.

TENDERS.

For rebuilding house and premises, No. 87, London-road, Southwark, for Mr. J. E. W. Rolls. Mr. R. J. Dickins, architect. Quantities supplied by Mr. C. B. Medland:—

Canning & Mullins	£710 0 0
Kent	655 0 0
Falkner	647 0 0
Cooper & Cullum	645 0 0
Linfield & Son (accepted)	597 0 0

For five houses and shops to be erected in Long-lane, West Smithfield. Mr. L. H. Isaacs, architect. Quantities supplied by Mr. L. C. Riddett:—

Simpson & Son	£6,200 0 0
Patman & Fotheringham	6,082 0 0
Macey	5,495 0 0
Mansfield, Price, & Co.	5,475 0 0
Holland & Hannen	5,400 0 0
Browne & Robinson	5,369 0 0
Phillips	5,195 0 0

For rebuilding house and premises, No. 343, Walworth-road, and alterations, &c., No. 345, ditto, for Mr. J. E. W. Rolls. Mr. R. J. Dickens, architect. Quantities supplied by Mr. C. B. Medland:—

Canning & Mullins	£420 0 0
Kent	333 0 0
Falkner	314 0 0
Linfield & Son	298 0 0
Cooper & Cullum (accepted)	298 0 0

For the erection of six cottages at Kingston, for Mr. H. Nash. Mr. J. S. Ellis, architect:—

Wells (accepted)	£1,530 0 0

For erecting two shops in forecourt of house, High-road, Upper Tooting. Mr. Herbert Taylor, architect:—

Potter	£870 0 0
Fish	865 0 0
Kilby	677 0 0

For new post-office, Bank-street, Ashford, for Mr. J. E. Munns, post-master. Mr. King, architect:—

Steddy, Joy, & Steddy	£845 0 0
Clifford	839 0 0
Dryland	780 0 0
Prebble	776 17 10
Fowler	769 0 0
Hamett	749 0 0
Peters (accepted)	722 12 0

For additions to Bramerton Hall, Norfolk. Mr. R. M. Phipson, architect:—

Hawes (accepted)	£2,410 0 0

For restoring the nave and aisles of Fressingfield Church, Suffolk. Mr. R. M. Phipson, architect:—

Grimwood (accepted)	£622 0 0

For new Congregational Chapel, Rouel-road, Bermondsey. Messrs. Lander & Bedells, architects:—

Little	5,379 0 0
Axford	4,825 0 0
Simpson	4,810 0 0
Browne & Robinson	4,795 0 0
Dove, Brothers	4,745 0 0
Groover	4,575 0 0
Mann	4,375 0 0
Manley & Rogers	4,347 0 0
Hart	4,310 0 0
Rider	4,310 0 0
Henshaw	4,295 0 0
Kent	4,275 0 0
Coleman	4,231 0 0
Hill & Sons	4,185 0 0
Wells	4,180 0 0

For benching Offton Church, Suffolk. Mr. R. M. Phipson, architect:—

Smith	£297 4 0
Cornish	195 0 0
Tooley (accepted)	180 0 0

For rebuilding 59 and 60, Wilson-street, Finsbury. Mr. Hammon, architect:—

Brass	£1,743 0 0
Grover	1,666 0 0
Ennor	1,600 0 0
S. Sabey	1,483 0 0
C. Sabey	1,262 10 0
Preedy & Son	1,250 0 0

For dwelling-house and shop, in North-road, Brighton, for Mr. J. Sayers. Mr. Dallimore, architect:—

Childs & Simmonds (accepted)	£733 0 0

For sewers in Sloane-square, for the Vestry of the Parish of St. Luke, Chelsea. Mr. Pattisson, surveyor:—

Bloomfield	£260 0 0
Morris	250 0 0
Lacy	210 0 0
Sawyer	207 0 0
Wigmore	198 10 0
Neave	187 0 0
Whittick (accepted)	178 0 0

For rebuilding warehouses, Nos. 4, 5, and 6, Maiden-head-court, and 19, Nicholl-square, E.C., for Messrs. Salomon. Mr. B. Tabberer, architect:—

Brass	4,182 0 0
Turner & Sons	3,973 0 0
Henshaw	3,786 0 0
Pritchard	3,747 0 0
A. E. Robinson	3,737 0 0
Browne & Robinson	3,676 0 0
Perry	3,647 0 0
Crabb & Vaughan	3,638 0 0
J. Pritchard	3,342 0 0

For sewerage works connected with the utilisation of the sewage, for the Borough of Cheltenham. Mr. D. J. Humphris, Borough Surveyor. Quantities furnished to contractors by Mr. J. Simmonds. Pipes supplied to the Commissioners by Messrs. Gibbs & Canning:—

Hall & Price	£7,790 0 0
Moore	5,120 0 0
Dierden	4,612 0 0
Ford	4,180 0 0
Fawkes & Maude	3,890 16 0
Field	3,392 11 4
Abell & Co. (accepted)	3,300 0 0
Coker (exclusive of compensation)	2,999 0 0

TO CORRESPONDENTS.

C. B. M.—J. J. E.—M. & F.—M. S.—W. B.—H. K. & W.—Pro.—Mr. M.—Mr. H.—F. R.—W. H. K.—E. D.—J. D.—W. P. T.—J. V.—J. G.—A.—W. C.—F. C.—J. P.—J. R.—Messrs. P.—J. D.—W. D. S.—H. W. L.—G. G.—Dr. R.—C. F. H.—Mr. H.—M. J.—W. H. C.—C. & V.—H. K. & W.—E. H. T.—J. T. (if the collector acted as the agent of the trustee, the trustee is liable. Take advice).—Messrs. H. & Co. (arrived too late).—H. S. (next week).

We are compelled to decline pointing out books and giving addresses.

All statements of facts, lists of Tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

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